D. M. E.
INSTRUMENTATION

TECHNICAL MANUAL

MP MASTER
MA23547

Face Standard

FABBRICA APPARECCHIATURE PER COMUNICAZIONI ELETTRICHE-STANDARD S.p.A.
MILANO - V.le Bodio 33 - Tel. 3772 - Telex 31040 - Cables FACESTANDARD - MILANO
ROMA - Via Abruzzi 25 - Tel. 463421 - Telex 61040 - Cables FACESTANDARD - ROMA
BOLOGNA - NAPOLI - PADOVA - PALERMO - MADDALONI

ITT

MP MASTER
MA23547

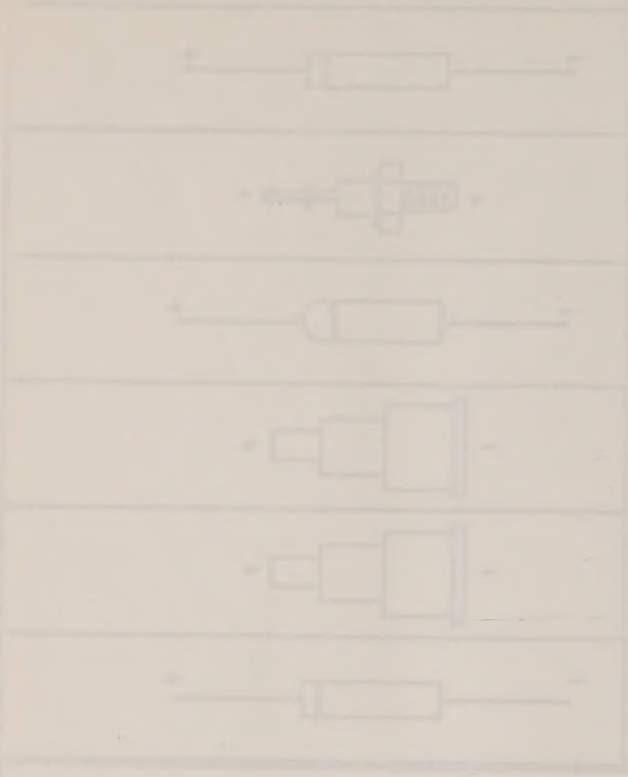
In the back cover boxes are some springs for the mains socket and for cables to avoid displacements during transport.

Dimensions

Cabinet	1506(h), 562(w), 671(d) mm.
Trolley	959(d), 641(w), 80(h) mm.
Weight	cabinet and trolley 50 Kg approx
	Total (included equipments) 139 Kg approx

Illustrations

Fig.1 Front view TM.42268 Sht 2/2
" 2 " " (photo 3099)
" 3 " " open panels (photo 3100)



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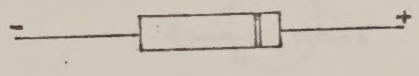
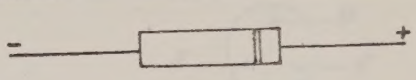
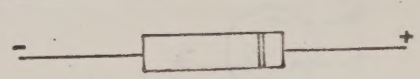
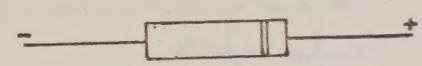
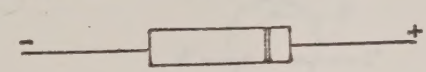
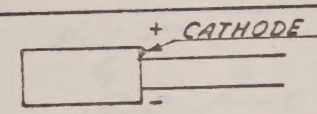
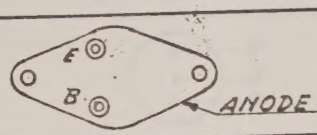
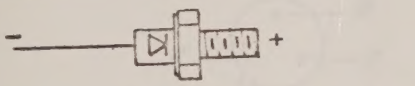
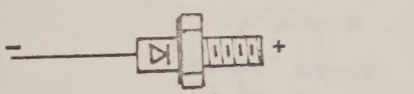
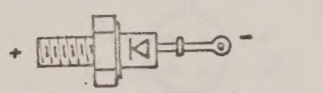
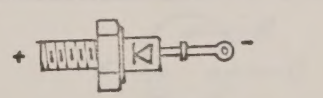
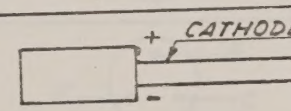
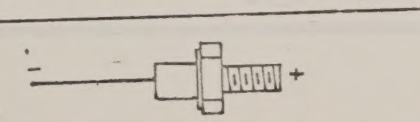
Z1	INTERMETAL	9.085.646	
ZF 5,6	"	9.005.352	
ZF 6.2	"	9.005.353	
ZF 4,7	"	9.005.354	
ZF 4.3	"	9.005.355	
OAZ 207	PHILIPS	9.006.226	
IN 2843-B	MOTOROLA	9.006.305	
10 M 6,2 AZ 10	"	9.006.303	
10 M 5,1 Z 5	"	9.006.304	
BZZ 20	PHILIPS	9.006.243	
BZZ 15	"	9.005.980	
Z 1 K	INTERMETAL	9.006.299	
10 M 3,9 AZ 10	MOTOROLA	9.006.244	

ZENERS

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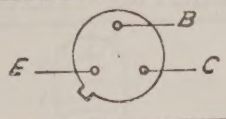
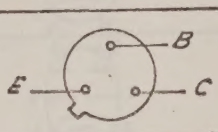
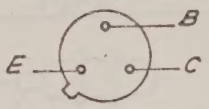
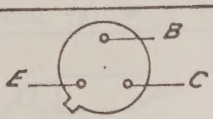
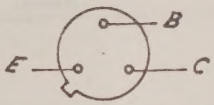
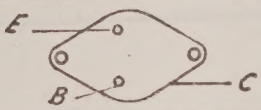
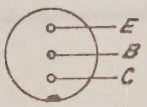
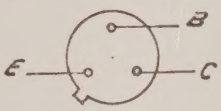
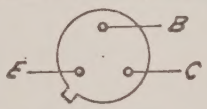
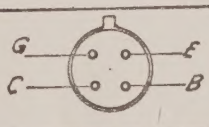
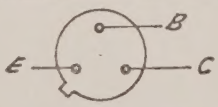
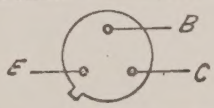
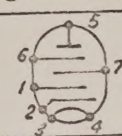
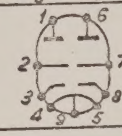
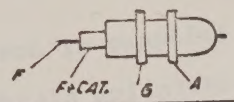
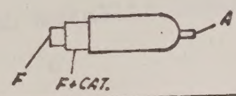
2N708	SGS	9.082.773	
2N1131	"	9.053.379	
2N914	"	9.085.948	
2N995	"	9.006.285	
2N1613	TEXAS	9.085.936	
BDY10	PHILIPS	9.005.378	
BCZ11	"	9.085.881	
2N978	"	9.005.380	
2N706	SGS	9.005.242	
2N918	"	9.000.224	
V746	"	9.005.143	
2N1893	TEXAS	9.005.377	

TRANSISTORS

rendarlo comunque noto a terzi senza sua autorizzazione scritta.

TYPE	SUPPLIER	FACE CODE	CONNECTION LAYOUT
CV 4063 6511	MULLARD	9'006'309	
CV4024 12AT7	"	9'080'917	
CV 273 EC 55	PHILIPS	9'006'310	
2-01C	EIMAC	9'006'277	

TUBES

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INSTRUMENTATION CABINET
FOR DME GROUND BEACON
Type FAS/1

The Instrumentation for DME ground beacon is supplied in a separate cabinet with a 4 wheels trolley (two wheels orientable on the front and two fixed wheels on the back, or with metallic housing suitable for transport and bench use.

The trolley can be dismantled when the equipment is used in a fixed installation.

The cabinet is of a 19" standard type with side covers and back door.

In the door is a housing for auxiliary items.

On the cabinet are installed the following meters :

F - 1450058	Peak RF wattmeter
E - 1450056	Reply meter
D - 1450057	Pulse generator
C -	Oscilloscope
B - 1450055	UHF Signal generator
A - 1450054	IF signal generator

The oscilloscope C may be as follows :

Tektronix type RM15 or

Philips

or any equivalent type

The units are fully withdrawable on slides.

In the lower part of the cabinet is a blank panel which height may be 3 units for Tektronix oscilloscope, or eliminated for Philips type, or 8 units if the oscilloscope is not foreseen.

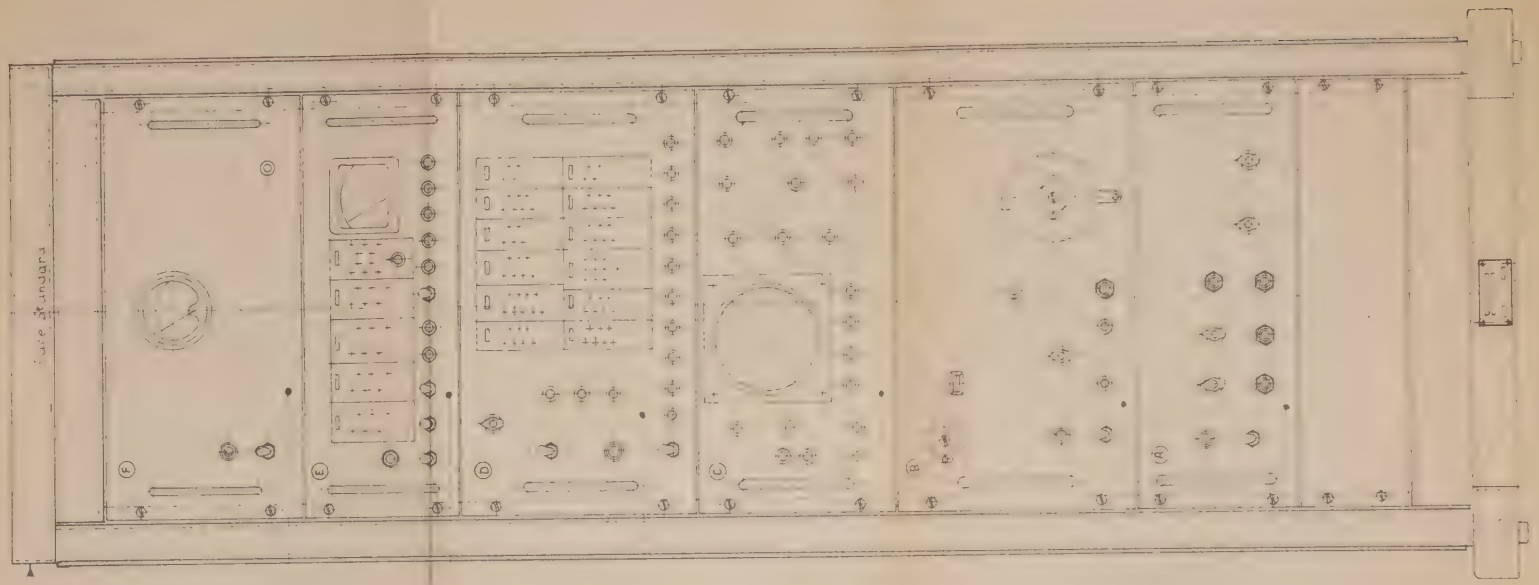
The mains supply input is in lower back part of the cabinet and distributed to three sockets in the lower and three on the upper part of the cabinet. To this sockets arrive the mains connectors of units. Each equipment has its ground terminal.

1./

Page-reference	Details of Amendment (s)
	add. C29 capacitor mica 60 pF ± 1% 500 WV type CMD 10 -4CR - EL MENCO - (or FACE) - code 9005490
	add. C30 capacitor tantalium 4,7 µF ± 10% 35WV type MC-14-F-475K - G.I.E - code 9005385
Page 16 F1	code 9085455 ..... to read 9007275
" " F2	" 9085453 ..... to read 9006922
" 21 V4	As V1 ..... to read ..... As V2
" 24	Add. Rd6 Detector silicium type AAZ13 PHILIPS code 9000242
Fig.6	Rd6 SGS 60 ..... to read Rd6 AAZ13
TM.633/A	
Page 6 line 3	Continuous modulated RF power : 10 mW (max) to read 3mV
" 7	Weight : Kg 8 approx ..... to read ..... 26 Kgs
" 20 Rd1	n°4 4x2x1 rectifier type 1 VA 120 ..... to read .....
	4x2x1 " " BYY10 - cod 9005414
TM.635/A	
Pag.3 line 21	Peack power : 10 KW .... to read .... 10 KW max
" " 23	Metering ..... ad ..... ± 20%
"	add.: Power requirement : 110-220-240V 45-65 Hz 5W
" 25	Fuses : 6A N°2 WEBER ..... to read .... 0.1A N°1 WEBER
	0.2A N°1 WEBER
" 4 " 3	Weight 30 Kgs ..... to read ..... 27 Kgs
" 8 F1	Code 9085452 ..... to read 9007272
F2	" 9085451 ..... to read 9007270
TM.639/A	
Page 5 line 7	6 Kgs ..... to read ..... 10 Kgs
" 17 F1	300 mA code 9085454 .... to read 500mA 9007275
" " F2	500 mA code 9085455 .... to read 300mA 9007273

Page-reference	Details of Amendment (s)
Page 28 R22	.... 1200 ohm ± 5% ..... to read .... 1200 ohm ± 1% code 9978309
" " RV2	..... type 81-203-20K .... to read 215-P1-203-20K

TM.42268 TAV. 2-2



2'450'212 1'450'058 1'450'056 1'450'057

OSCILLOGRAFO TEKTRONIX
TIPO-RM 15 1'450'062 OPPURE 1'450'055 1'450'054
(CASSETTO CON OSCILLOGRAFO PHILIPS)
OPPURE
PANNELLO FINTO 5451440

SERIE TARGHETTE INGLESE 4'450'568

VITE FISSAGGIO CASSETTO ALLE GUIDE
Q.tà .30 - TIPO - 5x12 T. 21 (3021424)

Ed	DATA	COMPONENTI	MATERIALE	FINITURA
1ª	7-6-67			

EQUIPAGGIAMENTO
STRUMENTAZIONE D.M.E.
(INGLESE)

SCALA 1:5

TM 42268 TAV. 2-2

TOLLERANZE SALVO DIVERSAMENTE INDICATO — QUOTE Sec. classe T. 752 — FORI Sec. T. 752 — MATERIALE Tolleranze sec. tabelle T. opp. UNI

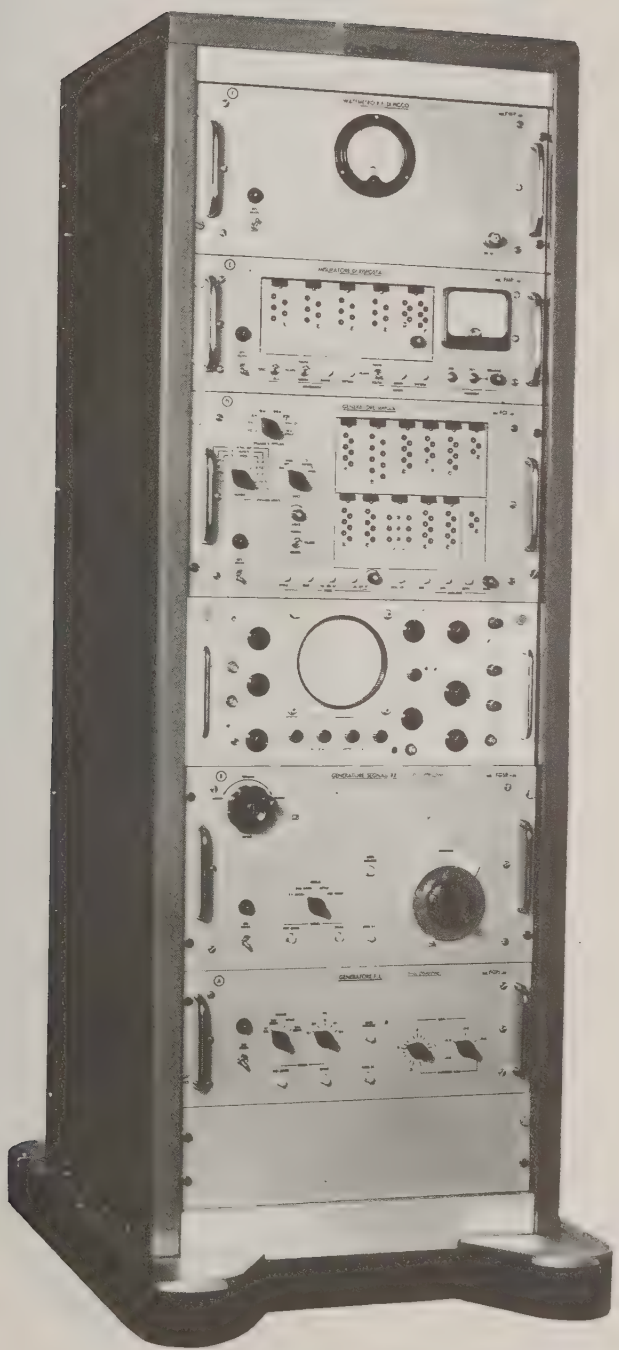


FIG.1

DME INSTRUMENTATION CABINET

TELAIO STRUMENTAZIONE DME

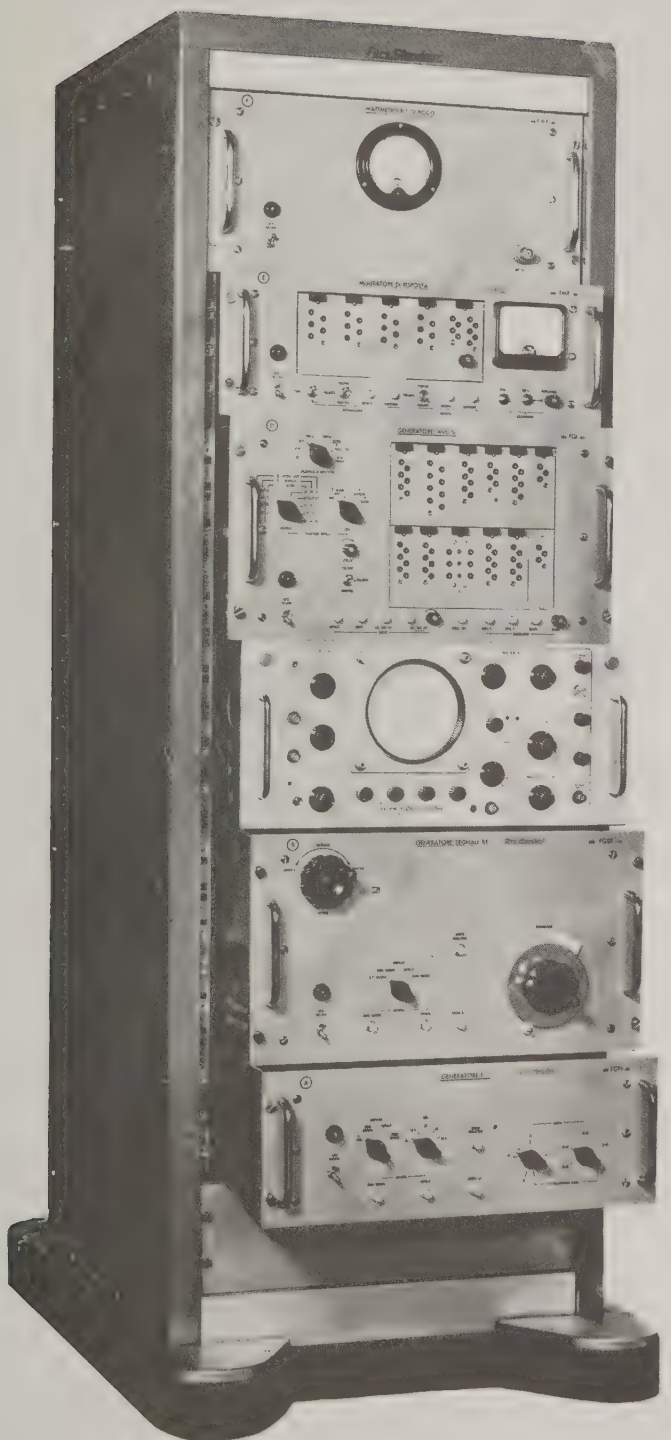


FIG.2

DME INSTRUMENTATION CABINET - DRAWERS OPEN

TELAIO STRUMENTAZIONE DME - CASSETTI APERTI

TM. 626/A

PULSE GENERATOR
TYPE FGI - 057

TM.626/A

P U L S E G E N E R A T O R

T Y P E FGI 057

FABBRICA APPARECCHIATURE PER COMUNICAZIONI ELETTRICHE-STANDARD S.p.A.
MILANO - V.le Bodio 33 - Tel. 3772 - Telex 31040 - Cables FACESTANDARD - MILANO
ROMA - Via Abruzzi 25 - Tel. 463421 - Telex 61040 - Cables FACESTANDARD - ROMA
BOLOGNA - NAPOLI - PADOVA - PALERMO - MADDALONI

I N D E X

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2 - Pulse generator - upper view (photo 3082)
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4 - Repetition frequency generation
5 - Logic unit
6 - Output circuits
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8 - Diagram SC.4450542 - (DA)-s Multivibrator 30-150-2700 c/s
8a - - (DA) Internal view (3065)
9 - Diagram SC.4450553 - (DB)-s Multivibrators 60-2840 c/s
10 - " SC.4450543 - (DB)-d Crystal oscillator 20 kc/s
10a - - (DB) Internal view (3060)
11 - Diagram SC.4450547- (DC)-s Divider for 8
12 - " SC.4450544- (DC)-d Flip-Flops
12a - - (DC) Internal view (3070)
13 - Diagram SC.4450561- (DD)-d Simulator
13a- - (DD) Internal view (3064)
14 - Diagram. SC.4450548- (DE)-s Gates
15 - " SC.4450545- (DE)-d Flip-Flops and (DG)-d, (DN)-d, (DL)-d
15a - - (DE) Internal view (3068)
16 - Diagram SC.4450546- (DF)-d 2 Mc/s clock
16a - (DF) Internal view (3075)
17 - Diagram SC.4450549- (DG)-s Gates
17a - - (DG) Internal view (3074)
18 - Diagram SC.4450552 - (DH)-s Gates
18a - (DH) Internal view (3071)
19 - Diagram SC.4450550 - (DI)-s Gates
20 - " SC.4450554 - (DI)-d Shaper
20a - - (DI) Internal view (3062)
21 - Diagram SC.4450551 - (DL)-s Gates
21a - (DL) Internal view (3061)
22 - Diagram SC.4450555 - (DM)-d Squarer
22a - - (DM) Internal view (3063)
23 - Diagram SC.4450556 - (DX)-d Filter unit
23a - (DX) Internal view (3069)
24 - Diagram SC.4450527 - (DN) +12V Stabilized supply
25 - " SC.4450529 - (DO) +6V +0,5V Stabilized supply
26 - " SC.4450465 - (DP) -6V Stabilized supply
27 - " SC.4450557 - Diode unit
28 - Equipment in metallic transportable cabinet

FGI-057 PULSE GENERATOR

PART 1 - GENERAL DESCRIPTION

1.1) GENERAL

The FGI-057 pulse generator is an instrument feeding gaussian pulses, single or double, with several p.r.f. and with amplitude and polarity adjustable at pleasure.

It is employed in the DME instrumentation, for inspection, tests and measures on DME beacons and, with an additional unit, on the TACAN beacons.

For mechanical design, it has been adopted the ISEP technique (fig.1), with circuits distributed on printed cards. Each plug-in has several test-points, so that main circuit points are always accessible. Moreover, together with the plug-in, the complete chassis is checkable, so that every circuit point is accessible to the operator (fig.2).

Particularly important are the complete transistorization and the exclusive silicon use, which have allowed, compared with preceding versions, a remarkable package reduction and a higher reliability.

The digital technique has allowed the simplification and standardization of many circuits : an high accuracy of the pulse times and the pulse pair spacing have been obtained. These times, in fact, are heavily controlled by a logic circuit system synchronized by a 2 Mc/s crystal clock.

A further feature of the generator is the operation as delay simulator, i.e. to generate delayed pulse pairs, compared with a reference inner signal.

1.2) OPERATING PRINCIPLE

The operating principle is specified by the fig.3 - simplified block diagram.

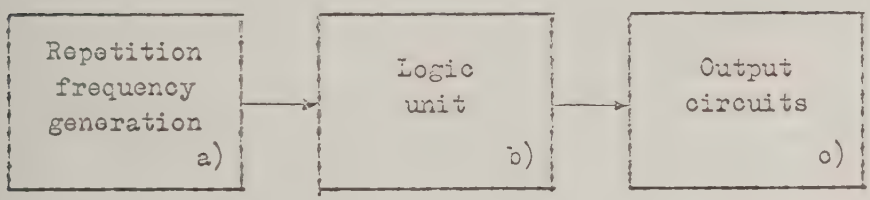


Fig.3 - Simplified block diagram

In a) with a switch, we decide the repetition frequency; it can be : 30 c/s, 150 c/s, 2700 c/s, 2500 c/s, 2840 c/s, 60 c/s. This frequency is squared and sent to suitable logic circuits.

In b) with other controls we select the pair spacing and produce one or two 3.5 /usec. width squared pulses.

These pulses in output circuits (c) are filtered, shaped and amplified.

1.3) TECHNICAL SPECIFICATIONS

1.3.1) Electrical specifications

Pulse output : From zero to 10 V continuously adjustable

Polarity : positive or negative

Output synchronization: to synchronize the scope for any p.r.f.

Mixer output : two inputs and a balance potentiometer.

RF generator calibration : 6 V pp , 2500 c/s square wave.

IF generator calibration : 2500 c/s square wave from 0 V to 8 V pp, continuously adjustable.

Pulse shape : gaussian; rise time and fall time : 2.5 ± 0.5 µsec. duration (at 50%) 3.5 ± 0.5 µsec.

Pulse repetition frequency : 30±2 c/s; 60±4 c/s; 150±10 c/s; 2500±1.25 c/s crystal; 2700±30 c/s; 2840±30 c/s; with external sinusoidal oscillator (2 V pp minimum) from 20 c/s to 20 Kc/s; with additional unit for Tacan : 33.3 kc/s ± 10 c/s, 41.7 kc/s ± 10 c/s, both crystal controlled.

Pulse spacing : single pulses or pulse pairs, with pulse spacing adjustable from 10 to 14 µsec., or from 28 to 32 µsec., or from 34 to 38 µsec. always by steps of 0.5 µsec. (1% accuracy).

Simulator : pulsed output with 60 c/s p.r.f. and delay, related to trigger signal, continuously adjustable from 30 to 60 µsec.

Power supply : 115 - 220 - 240 V ± 10% ; 45 ÷ 65 c/s; 60 W.

1.3.2) Thermal and mechanical specifications

Temperature range : -10 to +50°C

Dimensions : - Height 267 mm ; width 483 mm, depth 302 mm.

Weight : 20Kg approx

1.4) MISCELLANEOUS

Fuses	2A Ø 5x20	
	1A Ø 5x20	
Lamps	KL10 GLIMM COMAREL	
Diodes	SGS 60	SGS
	BYZ 13	PHILIPS
Zeners	4,7 - 4,3 - 21	INTERMETAL
Transistors	2N708-2N978-2N914-2N995	SGS
	2N1613	TEXAS I.
	BDY10-BCZ11	PHILIPS
Crystals	CR 18/U 2Mc/s	

PART 2 - EQUIPMENT OPERATION - GENERAL DESCRIPTION

2.1) GENERAL DESCRIPTION

With reference to the simplified block diagram (fig.3) we consider separately the three following sets.

2.1.1) Pulse repetition frequency generation

It includes some oscillators and multivibrators feeding the repetition frequencies to control the pulse generator.
In fig.4 is shown the block diagram.

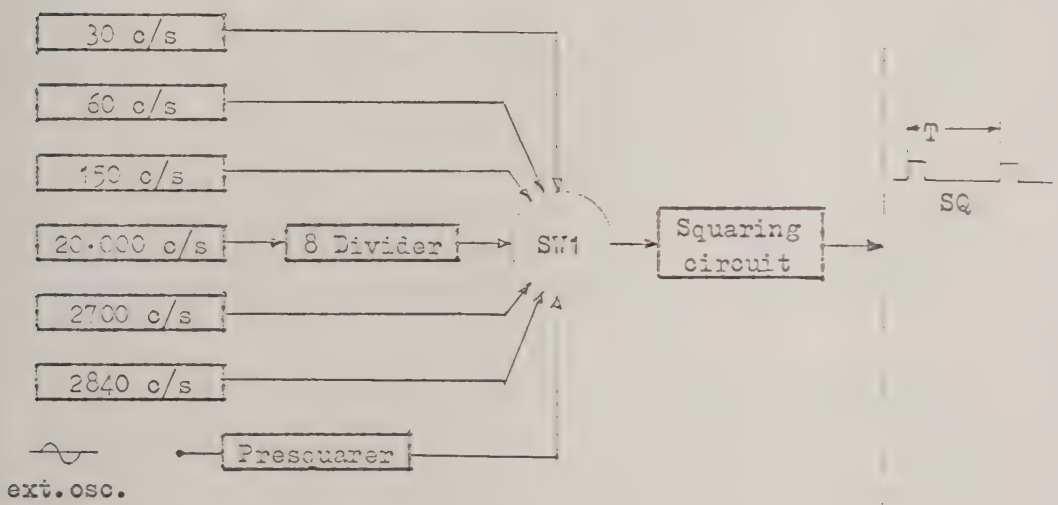


Fig.4

With SW1 switch we select the wanted p.r.f. and send to a squaring circuit: we obtain therefore, for any p.r.f., a squared wave and always at the same level, because it is necessary for logic circuit correct controls.

The 2500 c/s signal is delivered by a 20 kc/s crystal oscillator and a flip-flop 8-divider.

The external oscillator is presquared, for the correct trailing edges.

2.1.2) Logic unit

It contains some logic circuit as FLIP-FLOP and AND: neglecting the control circuits, the whole is arranged like the simplified block diagram of fig.5.

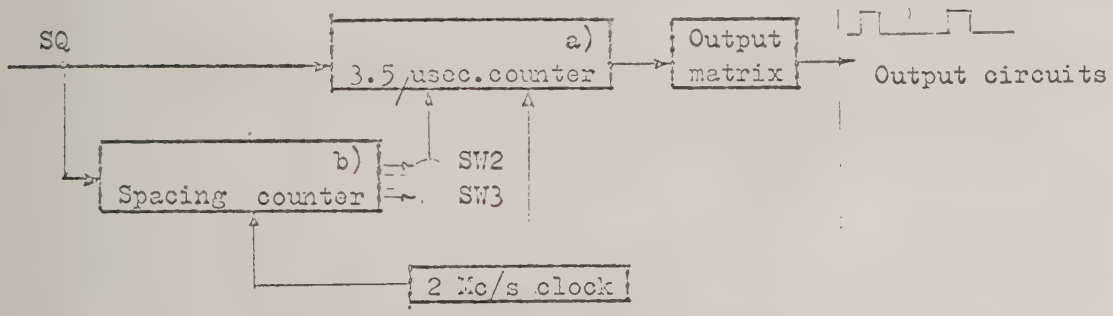


Fig.5

Both counters are composed by FLIP-FLOP, controlled and shunt-synchronized by a 2 Mc/s crystal clock; the counter time accuracy depends by the crystal accuracy and is therefore remarkable.

SQ signal triggers both counters; the a) counter stops after 3.5 µsec. gives an output and is zeroed: by the output matrix is obtained a 3.5 µsec. width squared pulse. SQ, at the same time triggers also b), which free counts just to 64 µsec.; with suitable controls withdraws at wanted time a pulse which triggers the 3.5 µsec. counter a) for a second count.

We obtain, therefore, for every period of SQ, a squared pulse or a squared pulse pair of fixed width (3.5 µsec.) and prefixed spacing (see 1.3.1).

2.1.3) Output circuits

Fig.6 shows a block diagram of output circuits.

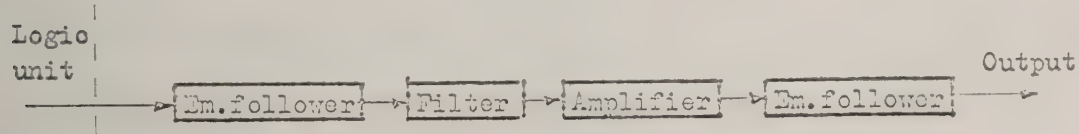


Fig.6 - Output circuit

The pulse (or pair) enters in an emitter follower, in the filter is shaped as gaussian, then amplified and fed to another emitter follower. These emitter followers serve for the quiet loading of preceding circuits.

2.2) SINGLE UNITS - DETAILED DESCRIPTION

In fig.7 we see the whole composition of the generator: the transformer, the power supplies, the controls and the terminals of plug-in printed cards.

We study now the plug-in circuits.

2.2.1) (DA) 30 c/s, 150 c/s, 2700 c/s Multivibrators (fig.8)

There are three typical multivibrators, utilizing junction transistor BCZ11, to tolerate the 12 V level.

The oscillation frequencies are determined by times due to C1 (R3 + RV1), C3 R9, C5 (R15 + RV2). In the timing network of the 150 c/s and 2700 c/s multivibrators there is an adjustment potentiometer, for frequency calibration.

2.2.2) (DB)s 60 c/s and 2840 c/s multivibrators (fig.9)

These circuits are of the same type of DA. The 2840 c/s astable has been obtained from the 2700 c/s multivibrator by adjusting RV2 only. The oscillation frequencies are established by times due to C1 (R3 + RV1) and C5 (R15 + RV2).

2.2.3) (DB)d 20 kc/s crystal oscillator (fig.10)

The V1 transistor (2N995) swings in a modified Pierce schematic, the C2, K1, C3 network gives the 180° necessary shift, and the V2 transistor operates as emitter follower only. V3 and V4 transistors form a classical "Schmitt trigger" which serves to square the oscillator output. V5, finally, operates as switch and further squares the signal, giving fast edges.

2.2.4) (DC) Eight Divider (fig.11 and 12)

For the duty cycle limitation (2700 pairs per sec.) the 20 kc/s frequency, which serves for the beacon main delay measures

$\left(\frac{1}{20.000} = 50/\text{usec.}\right)$ has been divided per eight.

The 20 kc/s squared signal is sent as clock signal, to three

FLIP-FLOPS, which carry out the frequency division.

The FLIP-FLOPS situated on the printed card DCd, are of R-S-T type, for the delays reduction; the control circuits, of diode AND type, constitute a matrix and are situated on DCs card.

2.2.5) (DD) Simulator (fig.13)

It is composed by a monostable (V1-V2-V3) and by a FLIP-FLOP (V4-V5). The monostable is used to delay the 60 c/s squared wave, and the flip-flop to resquare for fast trailing edges. The monostable time network is given by C2, C5, R8 and RV1.

The FLIP-FLOP output is a non-symmetrical squared wave with his trailing edge delayed from 30 to 60 μsec. related to that of 60 c/s monostable input.

2.2.6) Logic circuits (figg.14, 15, 17, 18, 19, 21)

The circuits are composed of 12 FLIP-FLOPS and 5 matrix cards; the FLIP-FLOPS are distributed on (DE)-d, (DG)-d, (DH)-d, (DL)-d, and the matrixes on (DE)-s, (DG)-s, (DH)-s, (DI)-s, (DL)-s.

The bistable circuits are all of R-S-T type; and all identical. They are shunt controlled and synchronized by a 2 Mc/s clock: the minimum time interval available is therefore 0.5 μsec. The matrixes are all of diode AND type.

The logic system includes two separate counters, one of 3.5 μsec. and another of 64 μsec. The first serves for the width of the pulse; the second counts freely till the moment that with particular controls we withdraw a pulse just at some instant. This pulse serves to retrigger the first counter, to obtain the pair second pulse.

2.2.7) (DF) 2 Mc/s clock (fig.16)

The V1 transistor operates as Pierce oscillator: the C1, X1, C2 network gives the 180° necessary shift. Other stages serve to square the oscillation only, particularly the trailing edge, which synchronizes all FLIP-FLOPS.

2.2.8) (DI)d Shaper (fig.20)

The input circuit, "OR" type (the output matrix of fig.5), forms the 3.5 /usec. width and feeds the signal to V1 emitter follower. The low-pass filter then shapes as gaussian the pulse and sends the signal to another emitter follower. The signal is then amplified in class A by V2, then amplified by V3 and sent to the output through a third emitter follower (V4).

2.2.9) Squaring circuits (fig.22)

The card contains three circuits: the real squaring circuit, the presquaring circuit and the calibration generator.

The squaring circuit is composed by two saturated stages operating as switches V1 and V2. The presquaring circuit have two zeners for input protection and is composed by V5, V6, V7, operates on the external oscillation only, if this is sent to SK5. The calibration generator is then composed by V3 and V4, and matches to wanted levels the amplitude of 2500 c/s 8-Divider output.

2.2.10) (DX) Filter unit (fig.23)

It is composed by three electrolytic filter capacitors, and by a loading resistor for +6 V power supply.

2.2.11) Mixer (fig.7)

It is composed by a potentiometer and two capacitors, and serves to add two signals at pleasure.

2.2.12) (DN)-(DO)-(DP)-Power supplies (figs.24-25-26). Are voltage stabilized for +12V, +6V, -6V on printed cards.

2.2.13) Additional Unit for Tacan - (DW)

It is composed by two crystal oscillators of the same type of (DB)-d: 33.3 kc/s and 41.7 kc/s. They serve for the reference signal calibration.

2.3) Operating Instructions

2.3.1) Power supply

The instrument is connected for 220V a.c. operation. For 110V a.c. operation take off the link between the F2 fuse and the I1 switch, and place it between the F2 fuse and the I1 switch.

2.3.2) Pulses output

Feed power to the generator, select with SW1 the repetition frequency, with SW2 the pulses spacing, with SW3 the polarity, and adjust the amplitude by means of RV1. The pulses pairs or the single pulses are fed to the SK1 output, while at SK2 there is a signal for the pulses synchronization on the oscilloscope.

2.3.3) RF and IF generators calibration

At SK3 there is a square wave signal of 2500 c/s and 6V pp. At SK4 there is the same signal, but with adjustable amplitude, by means of RV2, from 0V to 9V pp. These signals serve for the RF generator (FGSR-055) and IF generator (FIFG-054) calibrations respectively.

2.3.4) Mixer

Feed a signal to SK6, and another to SK7; place SW4 in the lower position. At the SK8 there is the two signal mixing, adjustable by means of RV3.

With SW4 on "Pulse generator" position, at SK8 there is the mixing of the SK6 signal with the pulse generator output (SK1)

PART 3

COMPONENT LIST

SUPPLIER ADDRESSES

AROS	Via Bollinzaghi,17 Milano		Transformers
API	Via Filelfo,10 Milano		Crystals
BOURNS	1200 Columbia Ave. Riverside - California (U.S.A.)	Special-Ind. Via Manin,33 Milano	Potentiometers
CALVANESE	Via M.Gioia, 80 Milano		Connectors
COMAREL	Via Montepulciano,17 Milano		Lamps
EL-MENCO (see note)	The Electromotive MFG.Co. Willimantic - Connecticut (U.S.A.)	MARANO A.V. Via Quadronno, 4 Milano	Capacitors
FACE	Via Bodio,33 Milano		Miscellaneous
FEME	Viale Certosa, 1 Milano		Switches
GIE	Via Turati, 28 Milano		Capacitors
INTERMETAL	H.Buntestr. Freiburg i.Breisgau Germ.	ITT Standard P.za De Angelis, 7 Milano	Semiconductors
ICAR	Via Medardo Rosso,16 Milano		Capacitors
METAL-LUX	Viale Sarca, 94 Milano		Varistors
MICROFARAD	Via M. Gioia,72 Milano		Capacitors

MIAL	Via Ronchi, 16 Milano		Capacitors
PHILIPS	Eindhoven (Holland)	Philips P.za IV Novembre,3 Milano	Semiconductors
SILVERSTAR	Via dei Gracchi,10 Milano		Connectors
SECME	13, Rue des Envierges Paris (France)	De Mico Via Manzoni, 31 Milano	Resistors
SECI	Via G.B.Grassi, 97 Milano		Resistors
SIEMENS	Hoffmann Str.51 Monaco (Germ.)	Via Fabio Filzi,29 Milano	Capacitors, elect.
SGS	Via Rostelli, 3 Milano		Semiconductors
TEXAS	Texas Instr. 6000 Lemmon Avenue Dallas, Texas (U.S.A.)	Texas Ital. Via Colautti,1 Milano	Semiconductors
VEAM	Via Figino, 16 Milano		Conductors
WEBER	Emmenbrucke (Swiss)	Molinari Via Ampere,106 Milano	Fuses

Note: EL-MENCO Capacitors are replaced by FACE or PRECIS
(8 Boulevard Menilmontant - PARIS (France)

Diagr. Ref.	Denomination	Supplier	FACE Code
C.1	Capacitor, paper 0,01 uF ± 10% 630 WV Type MCT Working temp. -40°+85°C (Ø5,5x19,5mm.)	MICROFARAD	9080142
C.2	Capacitor, film, miniature 0,1 uF ± 20% 250 Vd.c. Type HTR 10A4 (Ø 9,5x16 mm.)	ICAR	9004368
F.1	Fuse 2A (Ø 5x20 mm.)	WEBER	9085461
F.2	Fuse 1A (Ø 5x20 mm.)	WEBER	9085458
I.1	Switch, two poles Type B10-IS (19x34x29,5 mm.)	FEME	9080037
LP.1	Lamp., micromignon 110÷140V Type KL 10 "GLIMM" (Ø 9x28 mm.)	COMAREL	9082377
PL.1	Plug,mains type SIEMENS step 18,5xØ4,8 (36,5x38 mm.)	SIEMENS	9865293
RV.1	Potentiometer, miniature, linear 1Kohm ± 10% 1/2W type "L" Working temp. -55°C to +85°C Purchased by PLESSEY, code 9006282 Shaft modified to mm. 12 lenght (Ø 12,7x27 mm.)	FACE	7434858

Diagr. Ref.	Denomination	Supplier	FACE Code
RV2	As RV1		
RV.3	Potentiometer, miniature, linear 10 Kohm ± 10% 1/2W Type "L" Working temp -55°C to +85°C Purchased by Plessey, code 9006283 Shaft modified to mm. 12 lenght (Ø 12,7x27 mm.)	FACE	7434859
SK1÷8	Connector, coaxial Series BNC Type AN-UG-1094/U (CH.12,7x27 mm.)	VEAM	9082611
SW.1	Switch, 3 sectors, ceramic, 1 way 8 positions, Type GR.5930-C contacts not shortcircuiting, fixed contacts only on back (42x47,7x72 mm.)	FEME	9083103
SW.2	Switch, 5 sectors, ceramic, 3 ways 4 positions with common Type GR.5930-C Sector 1-2-3-4 with common to 1-5-9 " 5 " " " 2-6-10 Mobile contacts not shortcircuiting Fixed contact only on back (42x47,7x194 mm.)	FEME	9083104
SW.3	Switch, 7 sectors, ceramic 1 way, 9 positions type GR.5930-C Mobile contacts not shortcircuiting Fixed contacts only on back (42x47,7x136 mm.)	FEME	9083105
SW.4	Switch, two pole, 2 ways 2 positions type 17013 DJET L (12x16x24,5 mm.)	SECME	9005360

Diagr. Ref.	Denomination	Supplier	FACE Code
T.1	Transformer 60 VA Primary : 0-110V-220V-240V 45-65 c/s Secondary : term. 5-6 11,5V 1A " 7-8 11,5V 1A " 9-10 17,5V 1A Working temp. -20° to +65°C Continuons working - Rel.humidity 99% (72x83x130 mm.)	AROS	9006267
XF.1-2	Fuseholder 6A max Type 9102-A (19x32 mm.)	FACE	3502436
XLP.1	Lampholder type 210 red colour (ø 20x43 mm.)	COMAREL	9080407

30-150-2700 c/s MULTIVIBRATORS (DA)-c 4.450.542

Diagr. Ref.	Denomination	Supplier	FACE Code
C.1	Capacitors, polyester 0,1 /uF ± 5% 125 WV Type 602-3 Working temp. -40° to +70°C (Ø 12x26 mm.)	MIAL	9083047
C.2	As C1		
C.3	Capacitor, polyester 0,47 /uF ± 5% 125 WV Type 602-6 Working temp. -40° to +70°C (Ø 18,5x47 mm.)	MIAL	9083049
C.4	As C3		
C.5	Capacitor, polyester 0,01 /uF ± 5% 125 WV Type 602-1 Working temp. -40° to +70°C (Ø8x16,5 mm.)	MIAL	9083041
C.6	As C5		
PL.1	Connector, male, 21 poles (8x9x65 mm.)	FACE	6500459
R.1	Resistor, layer 3,3 Kohm ± 5% 1/2W (Ø 4,1x10,5 mm.)	SECI	9977313
R.2	Resistor, layer 3,32 Kohm ± 1% 1/2W series AT (Ø 4x17 mm.)	METAL LUX	9948351
R.3	Resistor, layer 45,3 Kohm ± 1% 1/2 W Series AT (Ø 4x17 mm.)	METAL LUX	9948464
R.4	As R3		

Diagr. Ref.	Denomination	Supplier	FACE Code
R.5	As R2		
R.6	As R1		
R.7	As R1		
R.8	As R2		
R.9	As R3		
R.10	As R3		
R.11	As R2		
R.12	As R1		
R.13	As R1		
R.14	Resistor, layer 1,82 Kohm ± 1% 1/2W series AT (Ø 4x17 mm.)	METAL LUX	9948326
R.15	Resistor, layer 22,1 Kohm ± 1% 1/2W series AT (Ø 4x17 mm.)	METAL LUX	9948434
R.16	As R.15		
R.17	As R.14		
R.18	As R.1		
RV.1	Resistor, variable 5 Kohm ± 10% 0,25W Type 275-1-502 "TRIMPOT" (7,9x7,9x31,7 mm.)	BOURNS	9005160

Diagr. Ref.	Denomination	Supplier	FACE Code
RV.2	As RV.1		
TP.1÷6	Test point (miniature) Type 5310 black (Ø 7x20 mm.)	CALVANESE	9004211
V.1÷V.6	Transistor PNP Type BCZ.11	PHILIPS	9085881

60 AND 2840 c/s MULTIVIBRATORS (DD)s 4.450.553

Diagr. Ref.	Denomination	Supplier	FACE Code
C.1	Capacitor, polyester 0,25 µF ± 5% 125WV Type 602-4 Working temp. -40° to +70°C (Ø 14x31 mm.)	MIAL	9083102
C.2	As C1		
C.5	Capacitor, polyester 0,01 µF ± 5% 125 WV. Type 602-1 Working temp. -40° to +70°C (Ø 8x16,5 mm.)	MIAL	9083041
C.6	As C5		
PL.1	Connector, male, 21 poles (8x9x65 mm.)	FACE	6500459
R.1	Resistor, layer 3,3 Kohm ± 5% 1/2W (Ø 4,1x10,5 mm.)	SECI	9977313
R.2	Resistor, layer 3,32 Kohm ± 1% 1/2W Series AT (Ø 4x17 mm.)	METAL-LUX	9948351
R.3	Resistor, layer 45,3 Kohm ± 1% 1/2W Series AT (Ø 4x17 mm.)	METAL-LUX	9948464
R.4	As R3		
R.5	As R2		
R.6	As R1		
R.13	As R1		

Diagr. Ref.	Denomination	Supplier	FACE Code
R.14	Resistor, layer 1,82 Kohm ± 1% 1/2W Series AT (Ø 4x17 mm.)	METAL-LUX	9948226
R.15	Resistor, layer 22,1 Kohm ± 1% 1/2W Series AT (Ø 4x17 mm.)	METAL-LUX	9948434
R.16	As R15		
R.17	As R14		
R.18	As R1		
RV.1	Resistor, variable 5 Kohm ± 10% 0,25W Type 275-1-502 "TRIMPOT" (7,9x7,9x31,7 mm.)	BOURNS	9005160
RV.2	As RV.1		
TP.1÷4	Test. point (miniature) Type 5310 black (Ø 7x20 mm.)	CALVANESE	9004211
V.1-2	Transistor PNP Type BCZ 11	PHILIPS	9085881
V.3-4	Not used		
V.5-6	As V1		

20 Ko/s OSCILLATOR (DB)..a 4.450.543

Diagr. Ref.	Denomination	Supplier	FACE Code
C.1	Capacitor, polyester, 0,47 uF ± 5% 125WL. Type 602-G Working temp. -40° +70°C (Ø 18.5x47 mm.)	MIAL	9083048
C.2	Capacitor, mica 4000 pF ± 1% 500WL. Type DM.19-4CR (17.5x14.2x7.8 mm.)	EL-MENCO	9005238
C.3	Capacitor, mica 2000 pF ± 1% 500WL. Type DM.19-4CR (17x13.4x6 mm.)	EL-MENCO	9005453
C.4	As C.1		
C.5	Capacitor, electrol, tantalium 4.7 uF ± 10% 35 WL. Type MCS 14-F475K Working temp -55°+85°C (Ø 4.7x15.4 mm.)	GIE	9005385
PL.2	Connector, male 21 poles (8x9x65 mm.)	FACE	6500459
R.1	Resistor, layer 22 Kohm ± 5% 1/2W (Ø 4.1x10.5 mm.)	SECI	9977409
R.2	" " 8.2 Kohm ± 5% 1/2W (Ø 4.1x10.5 mm.)	SECI	9977323
R.3	" " 5.6 Kohm ± 5% 1/2W (Ø 4.1x10.5 mm.)	SECI	9977319
R.4	Not used		
R.5	Resistor, layer 2.2 Kohm ± 5% 1/2W (Ø 4.1x10.5 mm.)	SECI	9977[illegible]

Diagr. Ref.	Denomination	Supplier	FACE Code
R.6	Resistor, layer 620 Kohm ± 5% 1/2W (Ø 4.1x10.5 mm.)	SECI	9977520
R.7	" " 5.1 Kohm ± 5% 1/2W (Ø 4.1x10.5 mm.)	SECI	9977318
R.8	" " 3.3 Kohm ± 5% 1/2W (Ø 4.1x10.5 mm.)	SECI	9977313
R.9	As R.8		
R.10	Resistor, layer 68 Kohm ± 5% 1/2W (Ø 4.1x10.5 mm.)	SECI	9977421
R.11	As R.8		
R.12	As R.8		
R.13	Resistor, layer 1.8 Kohm ± 5% 1/2W (Ø 4.1x10.5 mm.)	SECI	9977307
R.14	" " 2 Kohm ± 5% 1/2W (Ø 4.1x10.5 mm.)	SECI	9977308
R.15	" " 6.8 Kohm ± 5% 1/2W (Ø 4.1x10.5 mm.)	SECI	9977321
R.16	As R.5		
R.17	As R.8		
R.18	Resistor, layer 12 Kohm ± 1/2W ± 5% (Ø 4.1x10.5 mm.)	SECI	9977403
R.19	As R.13		
Rd.1	Diode, silicium Type SGS 60	SGS	9004209

Diagr. Ref.	Denomination	Supplier	...GE Code
PT.144	Test point (miniature) Type 5310 black (Ø 7x20 mm.)	CALVANESE	9004211
TP.5	Ground socket Type 5400 (Ø 6x14 mm.)	CALVANESE	9006058
V.1	Transistor P.N.P. Type 2N.995	SGS	9006285
V.2	As V.1		
V.3	Transistor N.P.N. Type 2N.914	SGS	9085948
V.4	As V.3		
V.5	Transistor N.P.N. Type 2N.708	SGS	9082773
X.1	Crystal 20Kc/s Type CR.38/U	API	9006275

GATES - Eight Divider (DC)-s 4.450.547

Diagr. Ref.	Denomination	Supplier	FACE Code
PL1	Connector, male 21 poles (8 x 9 x 65 mm)	FACE	6500459
R1 to R6	Resistor, layer 4.7 kohm ± 5% 1/2 W (Ø 4.1 x 10.5 mm)	SECI	9977317
Rd1 to 12	Diode, silicium Type SGS 60	SGS	9004209

FLIP-FLOPS (DC)A 4.4°C.544

Diagr. Ref.	Denomination	Supplier	FACE Code
C1	Capacitor, mica 180 pF ± 1% 500WV Type DM.10-40R (9,9x9,3x5,3 mm.)	EL-MENCO	9005179
C2	Capacitor, mica 47 pF ± 5% 500WV Type DM.10-40R (7,6x4,8x2,5 mm.)	EL-MENCO	9006317
C3	As C2		
C4	As C1		
C5	As C1		
C6	As C2		
C7	As C2		
C8	As C1		
C9	As C1		
C10	As C2		
C11	As C2		
C12	As C1		
C13	Capacitor, electrolitic, tantalium 4,7 µF ± 10% 35 WV Type MCS,14-F475X Working temp. -55° to +85°C (Ø 4,7x15,4 mm.)	GIE	9005385
PL2	Connector, male, 21 poles (8x9x65 mm.)	FACE	6500459
R1	Resistor, layer 51 Kohm ± 5% 1/2W (Ø 4,1x10,5 mm.)	SECI	9977418
R2	As R1		
R3	Resistor, layer 6,8 Kohm ± 5% 1/2W (Ø 4,1x10,5 mm.)	SECI	9977321

Diagr. Ref.	Denomination	Supplier	Ident. Code
R4	Resistor, layer 33,2 Kohm ± 1% 1/2W (Ø 4,1x10,5 mm.)	SESI	9978451
R5	Resistor, layer 1 Kohm ± 5% 1/2W (Ø 4,1x10,5 mm.)	SESI	9977301
R6	As R5		
R7	As R3		
R8	As R4		
R9	As R1		
R10	As R1		
R11	As R1		
R12	As R1		
R13	As R3		
R14	As R4		
R15	As R5		
R16	As R5		
R17	As R3		
R18	As R4		
R19	As R1		
R20	As R1		
R21	As R1		
R22	As R1		
R23	As R3		
R24	As R4		

Diagr. Ref.	Denomination	Supplier	FACE Code
R25	As R5		
R26	As R5		
R27	As R3		
R28	As R4		
R29	As R1		
R30	As R1		
Rd1÷Rd24	Diode, silicium type SGS 60	SGS	9004209
TP1÷6	Test point (miniatura) Type 5310 black (Ø 7x20 mm.)	CALVANESE	9004211
V1÷V6	Transistor, NPN Type 2N914	SGS	9085948

Pulse simulator (DD)-d 4.450.561

Diagr. Ref.	Denomination	Supplier	FACE Code
C1	Capacitor, mica 500 pF ± 1% 500 WV Type DM.15-4CR (11.4 x 9.1 x 4.3 mm)	EL-MENCO	9005434
C2	Capacitor, mica 6580 pF ± 1% 500WV Type DM.30-4CR	EL-MENCO	9005433
C3	Capacitor, mica 560 pF ± 5% 500WV Type DM.15-4CR (11.4 x 9.1 x 4.3 mm)	EL-MENCO	9004356
C4	Capacitor, polyester 0.01 uF ± 5% 125 WV Type 602-1 Working temp. -40° +70 °C (Ø 8 x 16.5 mm)	MIAL	9083041
C5	Capacitor, mica (for adjust.) (Inspect.dept.)	EL-MENCO	
PL2	Connector, male 21 poles (8 x 9 x 65 mm)	FACE	6500459
R1	Resistor, layer 10 kohm ± 5% 1/2 W (Ø 4.1 x 10.5 mm)	SECI	9977401
R2	Resistor, layer 3.3 kohm ± 5% 1/2 W (Ø 4.1 x 10.5 mm)	SECI	9977313
R3	Resistor, layer 1.8 kohm ± 5% 1/2 W (Ø 4.1 x 10.5 mm)	SECI	9977307
R4	Resistor, layer 2.2 kohm ± 5% 1/2 W (Ø 4.1 x 10.5 mm)	SECI	9977309
R5	As R1		
R6	As R2		
R7	Resistor, layer 3.9 kohm ± 5% 1/2 W (Ø 4.1 x 10.5 mm)	SECI	9977315

SC./

Pulse simulator (DD)-d 4.450.561

Diagr. Ref.	Denomination	Supplier	FACE Code
R8	Resistor, layer 5.1 kohm ± 5% 1/2 W (Ø 4.1 x 10.5 mm)	SECI	9977318
R9	As R1		
R10	Resistor, layer 51 kohm ± 5% 1/2 W (Ø 4.1 x 10.5 mm)	SECI	9977418
R11	As R2		
R12	Resistor, layer 6.8 kohm ± 5% 1/2 W (Ø 4.1 x 10.5 mm)	SECI	9977321
R13	As R12		
R14	Resistor, layer 2 kohm ± 5% 1/2 W (Ø 4.1 x 10.5)	SECI	9977308
R15	As R14		
R16	As R2		
R17	As R10		
R18	As R1		
Rd1 to Rd10	Diode, silicium Type SGS 60	SGS	9004209
RV1.	Resistor, variable 5 kohm ± 10% 0.25 W Type 275-1-502 "TRIMPOT" (7.9 x 7.9 x 31.7 mm)	BOURNS	9005160

Pulse simulator (DD)-d 4.450.561

Diagr. Ref.	Denomination	Supplier	FACE Code
TP1 to 4	Test point (miniature) Type 5310, black (Ø 7 x 20 mm)	CALVANESE	9004211
V1	Transistor N.P.N. Type 2N708	SGS	9082773
V2	As V1		
V3	Transistor P.N.P. 2N995	SGS	9006285
V4	Transistor N.P.N. 2N914	SGS	9085948
V5	As V4		

CARTE - (DD)-s 4450548

Diagr. Ref.	Denomination	Supplier	FACE Code
PL1	Connector, male 21 poles (8 x 9 x 65 mm)	FACE	6500459
R1 to R8	Resistor, layer 4.7 kohm ± 5% 1/2 W (Ø 4.1 x 10.5 mm)	SECI	9977317
Rd1 to 28	Diode, silicium Type SGS 60	SGS	9004209

[illegible]

Diagr. Ref.	Denomination	Supplier	FACE Code
C1 to C12	Capacitor, mica 47 pF ± [illegible] 500 WV Type DM.10-4CR (7.6 x [illegible] x 2.[illegible] mm)	EL-MENCO	9006317
C13	Capacitor, electrolitic Tantalium 4.7 uF ± 10% 35 WV Type MOS.14-F.475 K Working Temp. -55° to + 85 °C (Ø 4.7 x 15.4 mm)	GIE	9005385
PL2	Connector, male 21 poles (8 x 9 x 65 mm)	FACE	6500459
R1	Resistor, layer 51 kohm ± 5% 1/2 W (Ø 4.1 x 10.5 mm)	SICI	9977418
R2	As R1		
R3	Resistor, layer 6.8 kohm ± 5% 1/2 W (Ø 4.1 x 10.5 mm)	SICI	9977321
R4	Resistor, layer 33.2 kohm ± 1% 1/2 W (Ø 4.1 x 10.5 mm)	SICI	9978451
R5	Resistor, layer 1 kohm ± 5% 1/2 W (Ø 4.1 x 10.5 mm)	SICI	9977301
R6	As R5		
R7	As R3		
R8	As R4		
R9	As R1		
R10	As R1		
R11	As R1		

34./

Flip-Flop (DLd - DGd - DHd - DId) 4450545

Diagr. Ref.	Denomination	Supplier	FACE Code
R12	As R1		
R13	As R3		
R14	As R4		
R15	As R5		
R16.	As R5		
R17	As R3		
R18	As R4		
R19	As R1		
R20	As R1		
R21	As R1		
R22	As R1		
R23	As R3		
R24	As R4		
R25	As R5		
R26	As R5		
R27	As R3		
R28	As R4		

Diagr. Ref.	Denomination	Supplier	FACE Code
R29	As R1		
R30	As R1		
Rd1 to Rd24	Diode, silicium Type SGS 60	SGS	9004209
TP1 to 6	Test point (miniature) Type 5310 Black (Ø 7 x 20 mm)	CALVANESE	9004211
V1 to V6	Transistor N.P.N. Type 2N.914	SGS	9005948

2 Mc/s Clock (DF)-d 4450546

Diagr. Ref.	Denomination	Supplier	FACE Code
C1	Capacitor, mica 220 pF ± 5% 500 WV Type DM.15-4CR (11.7 x 9.6 x 4.8 mm)	EL-MENCO	9004351
C2	Capacitor, mica 820 pF ± 5% 300 WV Type DM.15-4CR (12 x 10.7 x 4.8 mm)	EL-MENCO	9004358
C3	Capacitor, mica 100 pF ± 5% 500WV Type DM.15-4CR (11.7 x 9.1 x 4.5 mm)	EL-MENCO	9004347
C4	As C3		
C5	Capacitor, electrolitic, tantalium 4.7 uF ± 10% 35 WV -55° to +85 °C Type MCS-14F 475K (Ø 4.7 x 15.4 mm)	GIE	9005385
PL2	Connector, male 21 poles (8 x 9 x 65 mm)	FACE	6500459
R1	Resistor, layer 3.3 kohm ± 5% 1/2 W (Ø 4.1 x 10.5 mm)	SECI	9977313
R2	Resistor, layer 10 kohm ± 5% 1/2 W (Ø 4.1 x 10.5 mm)	SECI	9977401
R3	Resistor, layer 100 kohm ± 5% 1/2 W (Ø 4.1 x 10.5 mm)	SECI	9977501
R4	Resistor, layer 2.2 kohm ± 5% 1/2 W (Ø 4.1 x 10.5 mm)	SECI	9977309
R5	Resistor, layer 68 kohm ± 5% 1/2 W (Ø 4.1 x 10.5 mm)	SECI	9977421

2 Mc/s Block (DT)-A 4450513

Diagr. Ref.	Denomination	Supplier	FACE Code
R6	Resistor, layer 1 kohm ± 5% 1/2 W (Ø 4.1 x 10.5 mm)	SEDI	9977301
R7	Resistor, layer 5.1 kohm ± 5% 1/2 W (Ø 4.1 x 10.5 mm)	SEDI	9977313
R8	As R1		
R9	As R6		
R10	As R1		
Rd1	Diode, silicium Type SGS 60	SGS	9004203
TP1 to 3	Test point (miniature) Type 5310, black (Ø 7 x 20 mm)	CALVANESE	9004211
V1	Transistor N.P.N. Type 2N914	SGS	9085940
V2	As V1		
V3	As V1		
X1	Crystal, 2 Mc/s Type CR.18/U (c.7 x 19 x 26 mm.	API	9006276

GATES (DG's A150519

Diagr. Ref.	Denomination	Supplier	FACE Code
PL.1	Connector, male 21 poles (8 x 9 x 65 mm)	FACE	6500459
R1 to R8	Resistor, layer 4.7 kohm ± 5% 1/2 W (⌀ 4.1 x 10.5 mm)	SECI	9977317
Rd1 to 16	Diode, silicium Type SGS 60	SGS	9004209

GATES (DH)-s 4450552

Diagr. Ref.	Denomination	Supplier	FACE Code
PL1	Connector, male 21 polos (8 x 9 x 65 mm)	FACE	6500459
R1 to R8	Resistor, layer 4.7 kohm ± 5% 1/2 W (Ø 4.1 x 10.5 mm)	SECI	9977317
Rd1 to 22	Diode, silicium Type SGS 60	SGS	9004209

GATTS (DI)s 4450550

Diagr. Ref.	Denomination	Supplier	FACE Code
PL1	Connector, male 21 poles (8 x 9 x 65 mm)	FACE	6500459
R1 to R5	Resistor, layer 4.7 kohm ± 5% 1/2 W (Ø 4.1 x 10.5 mm)	SEDI	9977317
Rd1 to Rd29	Diode, silicium Type SGS 60	SGS	9004209

Shaper (DM)-d 4.450.554

Diagr. Ref.	Denomination	Supplier	FACE Code
C1	Capacitor, mica 680 pF ± 1% 300 WV Type DM.15-4CR (9.9 x 6.3 x 3.5 mm)	EL-MENCO	9005186
C2	Capacitor, mica 2500 pF ± 1% 300WV Type DM.19-4CR (15.2 x 10.1 x 4.8 mm)	EL-MENCO	9006280
C3	As C2		
C4	As C1		
C5	Capacitor, mica 470 pF ± 1% 300 WV Type DM.15-4CR (11.9 x 9.9 x 3 mm)	EL-MENCO	9006281
C6	As C5		
C7	Capacitor, polyester 100,000 pF ± 1% 125 WV Type 602-3 (Ø 12 x 26 mm)	MIAL	9083047
C8	As C5		
C9	As C5		
C10	As C7		
L1	Coil, variable, magnetic core (N°310 Turns formivex D Ø 0.27 mm)	FACE	5450939
L2	Coil, variable, magnetic core (N°330 turns formivex D Ø 0.27 mm)	FACE	5450940

Shaner (DI)-d 4.450.554

Diagr. Ref.	Denomination	Supplier	FACE Code
L3	Coil, variable, magnetic core (N°210 turns formivex D Ø 0.27 mm)	FACE	5450941
L4	Coil (N°190 turns Ø 0.27 mm)	FACE	5451241
PL2	Connector, male 21 poles (8 x 9 x 65 mm)	FACE	6500459
R1	Resistor, layer 51 kohm ± 5% 1/2 W (Ø 4.1 x 10.5 mm)	SECI	9977418
R2	Resistor, layer 3.3 kohm ± 5% 1/2 W (Ø 4.1 x 10.5 mm)	SECI	9977313
R3	Resistor, layer 1.2 kohm ± 5% 1/2 W (Ø 4.1 x 10.5 mm)	SECI	9977303
R4	As R2		
R5	As R2		
R6	Resistor, layer 180 ohm ± 5% 1/2 W (Ø 4.1 x 10.5 mm)	SECI	9977207
R7	Resistor, layer 200 ohm ± 5% 1/2 W (Ø 4.1 x 10.5 mm)	SECI	9977208
R8	Resistor, layer 680 ohm ± 5% 1/2 W (Ø 4.1 x 10.5 mm)	SECI	9977221
R9	Resistor, layer 510 ohm ± 5% 1/2 W (Ø 4.1 x 10.5 mm)	SECI	9977218
R10	As R2		

GATOS (DL)-s 4450551

Diagr. Ref.	Denomination	Supplier	FACE Code
PL1	Connector, male 21 poles (8x9x65 mm)	FACE	6500459
R1 to R5	Resistor, layer 4.7 kohm ± 5% 1/2 W (Ø 4.1 x 10.5 mm)	SECI	9977317
Rd1 to Rd21	Diode, silicium Type SGS 60	SGS	9004209

S.UAR R (DX).d 4.450.555

Diagr. Ref.	Denomination	Supplier	FACE Code
C.1	Capacitor, mica 1940 pF ± 5% 500 WL. Type DM.19-4-CR (18x13,2x5,6 mm.)	DL MENCO	9006319
PL.2	Connector male 21 poles (8x9x65 mm.)	FACE	6500459
R.1	Resistor, layer 6.8 Kohm ± 5% 1/2W (Ø 4.1x10.5 mm.)	SECI	9977321
R.2	Resistor, layer 10 Kohm ± 5% 1/2W (Ø 4.1x10.5 mm.)	SECI	9977401
R.3	Resistor, layer 1 Kohm ± 5% 1/2W (Ø 4.1x10.5 mm.)	SECI	9977301
R.4	Resistor, layer 3,3 Kohm ± 5% 1/2W (Ø 4.1x10.5 mm.)	SECI	9977313
R.5	As R.4		
R.6	As R.4		
R.7	As R.3		
R.8	As R.2		
R.9	Resistor, layer 2 Kohm ± 5% 1/2W (Ø 4.1x10.5 mm.)	SECI	9977308
R.10	As R.2		
R.11	As R.2		
R.12	As R.4		

Ref.	Denomination	Supplier	A.C.L. Code
R.13	As R.3		
R.14	Resistor, layer 2.2 Kohm ± 5% 1/2W (ø 4.1x10.5 mm.)	SECI	9977309
R.15	As R.4		
R.16	As R.14		
R.17	As R.14		
R.18	As R.3		
R.19	As R.14		
R.20	As R.4		
R.21	Resistor, layer 22 Kohm ± 5% 1/2W (ø 4.1x10.5 mm.)	SECI	9977409
R.22	As R.21		
R.23	As R.14		
R.24	As R.4		
R.25	Resistor, layer 5.1 Kohm ± 5% 1/2W (ø .1x10.5 mm.)	SECI	9977401
R.26	Resistor, layer 10 Kohm ± 5% 1/2W (ø 4.1x10.5 mm.)	SECI	9977401
Rd.1	Diode, silicium type SGS 60	SGS	9004209
2	As Rd.1		

Diagr. Ref.	Denomination	Supplier	FACE Code
Rdz.1	Diode, Zener Type Z.1	INTERMETAL	9085640
Rdz.2	As Rdz.1		
TP.1÷6	Test point (Miniature) Type 5310 black 7 (Ø 7x20 mm.)	CALVANESE	9004211
V1÷V7	Transistor N.P.N. Type 2N708	SGS	9082773

+12V STABILIZED SUPPLY BT. (DN) 4.450.527

Diagr. Ref.	Denomination	Supplier	FACE Code
C.1	Capacitor, electrolit. 1000 µF 35÷40 WL. Type B 41010 A 7108-S (Ø 20x56 mm.)	SIEMENS	9005383
C.2	As C.1		
R.1	Resistor, layer 3,83 Kohm ± 1/2W (Ø 4,1x10,5 mm.)	SECI	9978357
R.2	Resistor, layer 3,92 Kohm ± 1% 1/2W (Ø 4,1x10,5 mm.)	SECI	9978358
R.3	Resistor, layer 1,3 Kohm ± 1% 1/2W (Ø 4,1x10,5 mm.)	SECI	9978312
R.4	As R.1		
R.5	Resistor, layer 619 ohm ± 1% 1/2W (Ø 4,1x10,5 mm.)	SECI	9978277
R.6	Resistor, layer 221 ohm ± 1% 1/2W (Ø 4,1x10,5 mm.)	SECI	9978234
R.7	Resistor, layer 2,87 Kohm ±1% 1/2W (Ø4,1x10,5 mm.)	SECI	9978345
R.8	Resistor, layer 2,32 Kohm ± 1% 1/2W (Ø 4,1x10,5 mm.)	SECI	9978336
R.9	Resistor, layer 6,81 Kohm ± 1% 1/2W (Ø 4,1x10,5 mm.)	SECI	9978381
R.10	Resistor, layer 1,74 Kohm ± 1% 1/2W (Ø 4,1x10,5 mm.)	SECI	9978324
R.11	Resistor, layer 3.32 Kohm ± 1/2W (Ø 4,1x10,5 mm.)	SECI	9978351
R.12	As R.11		

Diagr. Ref.	Denomination	Supplier	FACE Code
R.13	Resistor, layer 10 Kohm ± 1% 1/2W (Ø 4,1x10,5 mm.)	SECI	9978401
R.14	Resistor, layer 1.15 Kohm ± 1/2W (Ø 4,1x10,5 mm.)	SECI	9978307
R.15	Resistor, layer 1 Kohm ± 1% 1/2W (Ø 4,1x10,5 mm.)	SECI	9978301
R.16	Resistor, layer 2 ohm ± 1% 1/2W (Ø 4,1x10,5 mm.)	SECI	9978030
Rd.1	Rectifier, silicium type SGS 60	SGS	9004209
Rd.2	Rectifier, silicium Type BYZ 13	PHILIPS	9082743
Rd.3	As Rd.2		
Rd.4	As Rd.2		
Rd.5	As Rd.2		
Rdz.1	Diode, Zener Type ZF 5,6	INTERMETAL	9005352
Rdz.2	Diode, Zener Type ZF 6,2	INTERMETAL	9005353
Rdz.3	As Rdz.1		
RV.1	Resistor, variable 200 ohm ± 10% Type 3067 P.1-201 (Ø 9.1x27 mm.)	BOURNS	9005354
V.1	Transistor,N.P.N. Type 2N 708	SGS	9082773
V.3	As V.1		
V.4	As V.1		
V.5	As V.1		

Diagr. Ref.	Denomination	Supplier	FACE Code
V.6	Transistor P.N.P. Type 2N1131	S.G.S.	9005379
V.7	Transistor, N.P.N. Type 2N1613	PEXAS INST.	9085936
V.8	Transistor N.P.N. Type BDY 10	PHILIPS	9005378

+6V STABILIZED SUPPLY BT. (DC) [illegible]

Diagr. Ref.	Denomination	Supplier	[illegible] Code
C.1	Capacitor, electrolit. 1000 µF 35÷40V Type B 41010 A 7108-S (Ø 20x56 mm.)	SIEMENS	9005383
C.2	As C.1		
R.1	Resistor, layer 681ohm ± 1% 1/2W (Ø 4.1x10.5 mm.)	SECI	9978281
R.2	Resistor, layer 2.74 Kohm ± 1% 1/2W (Ø 4.1x10.5 mm.)	SECI	[illegible]
R.3	Resistor, layer 1.3 Kohm ± 1% 1/2W (Ø 4,1x10,5 mm.)	SECI	9978312
R.4	As R.1		
R.5	Resistor, layer 619 ohm ± 1% 1/2W (Ø 4,1x10,5 mm.)	SECI	9978277
R.6	Resistor, layer 221 ohm ± 1% 1/2W (Ø 4,1x10,5 mm.)	SECI	[illegible]
R.7	Resistor, layer 1,21 Kohm ± 1% 1/2W (Ø 4,1x10,5 mm.)	SECI	9978309
R.8	As R.2		
R.9	Resistor, layer 2.43 Kohm ± 1% 1/2W (Ø 4.1x10.5 mm.)	SECI	[illegible]
R.10	Resistor, layer 332 ohm ± 1% 1/2W (Ø 4.1x10.5 mm.)	SECI	[illegible]

Diagr. Ref.	Denomination	Supplier	Code
R.11	Resistor, layer 3,32 Kohm ± 1% 1/2W (ø 4.1x10.5 mm.)	SEOI	9978351
R.12	As R.11		
R.13	Resistor, layer 7.5 Kohm ± 1% 1/2W (ø 4.1x10.5 mm.)	SEOI	9978355
R.14	Resistor, layer 243 ohm ± 1% 1/2W (ø 4.1x10.5 mm.)	SEOI	9978233
R.15	Resistor, layer 750 ohm ± 1% 1/2W (ø 4.1x10.5 mm.)	SEOI	9978285
R.16	Resistor, layer 2 ohm ± 1% 0,5W (ø 4.1x10.5 mm.) series 995-1A	OHMITE	9107380
R.17	Resistor, layer 523 ohm ± 1% 1/2W (ø 4.1x10.5 mm.)	SEOI	9978270
Rd.1	Rectifier, silicium type SGS 60	SGS	9004209
Rd.2	Rectifier, silicium type BYZ 13	PHILIPS	9002743
Rd.3	As Rd.2		
Rd.4	As Rd.2		
Rd.5	As Rd.2		
Rdz.1	Diode ZENER Type ZF 4.7	INTERMETAL	9005354
Rdz.2	Diode ZENER Type ZF 4.3	INTERMETAL	9005355
Rdz.3	As Rdz.2		

Diagr. Ref.	Denomination	Supplier	FACE Code
Rdz.4	Diode ZENER Type Z.1	INTERMETAL	9005382
RV.1	Resistor, variable 200 ohm ± 10% Type 3067-P.1-201 (ø 9.1x27 mm.)	BOURNS	9005351
V.1	Transistor, N.P.N. Type 2N 708	SGS	9082773
V.2	As V.1		
V.3	As V.1		
V.4	As V.1		
V.5	As V.1		
V.6	Transistor, P.N.P. Type 2N 978	SGS	9005380
V.7	Transistor, N.P.N. Type 2N 1613	TEXAS	9085936
V.8	Transistor, N.P.N. Type BDY 10	PHILIPS	9005378

Diagr. Ref.	Denomination	Supplier	FACE Code
C1	Capacitor, eletrolit. 1000 µF 35÷40 WL. Type B 41010 A 7108-S (ø 20x56 mm.)	SIEMENS	9005383
C2	As C1		
R1	Resistor, layer 681ohm ± 1% 1/2W (ø 4,1x10,5 mm.)	SECI	9978281
R2	" " 2,74 Kohm ± 1% 1/2W (ø 4,1x10,5 mm.)	SECI	9978343
R3	" " 1,3 Kohm ± 1% 1/2W (ø 4,1x10,5 mm.)	SECI	9978312
R4	As R1		
R5	Resistor, layer 619ohm ± 1% 1/2W (ø 4,1x10,5 mm.)	SECI	9978277
R6	" " 221ohm ± 1% 1/2W (ø 4,1x10,5 mm.)	SECI	9978234
R7	" " 1,21 Kohm ± 1% 1/2W (ø 4,1x10,5 mm.)	SECI	9978309
R8	As R2		
R9	Resistore, layer 2,43 Kohm ± 1% 1/2W (ø 4,1x10,5 mm.)	SECI	9978338
R10	" " 332ohm ± 1% 1/2W (ø 4,1x10,5 mm.)	SECI	9978251
R11	" " 3,32 Kohm ± 1% 1/2W (ø 4,1x10,5 mm.)	SECI	9978351
R12	As R11		

Diagr. Ref.	Denomination	Supplier	PHCE Code
R13	Resistor, layer 7,5 Kohm ± 1% 1/2W (ø 4,1x10,5 mm.)	SECI	9978385
R14	" " 243ohm ± 1% 1/2W (ø 4,1x10,5 mm.)	SECI	9978238
R15	" " 750ohm ± 1% 1/2W (ø 4,1x10,5 mm.)	SECI	9978285
R16	" " 2ohm ± 5% 1,5W series 995-1A (ø 4,1x10,5 mm.)	OHMITE	9007380
Rd1	Rectifier, silicium Type S.G.S.60	SGS	9004209
Rd2÷5	Rectifier, silicium Type BYZ 13	PHILIPS	9082743
Rdz.1	Diode, ZENER Type ZF 4,7	INTERMETAL	9005354
Rdz.2	Diode, ZENER Type ZF 4,3	INTERMETAL	9005355
Rdz.3	As Rdz.1		
RV.1	Resistor, variable 200ohm ±,10% Type 3067-P.1-201 (ø9,1x27mm.)	BOURNS	9005351
V.1÷V.5	Transistor N.P.N. Type 2N 708	SGS	9082773
V.6	Transistor P.N.P. Type 2N 978	SGS	9005380
V.7	Transistor N.P.N. Type 2N 1613	TEXAS	9085936
V.8	Transistor N.P.N. Type BDY 10	PHILIPS	9005378

CAPACITOR UNIT (DH)-d 4.450.556

Diagr. Ref.	Denomination	Supplier	FACE Code
C.1÷C.3	Capacitor, electrolit. 1000 µF 35/40 VL Type B.41010-A 7108-S (ø 20.5x55 mm.)	SIEMENS	9005383
PL.2	Connector, male 21 poles (ø 8x9x65 mm.)	FACE	6500459
R.1	Resistor, wire 33 ohm ± 5% 7W type RSM 8x34	SECI	9987113
TP.1÷3	Test point (miniature) Type 5310 black (ø 7x20 mm.)	CALVANESE	9004211

DIODES UNIT 4.450.557

Diagr. Ref.	Denomination	Supplier	FACE Code
R1	Resistor, layer 4,7 Kohm ± 5% 1/2 W (ϕ 4,1x10,5 mm.)	SEOI	9977317
R2	As R1		
Rd1414	Diode, silicium SGS 60	SGS	9004209

PART 4

ILLUSTRATIONS

NOTE : Figg.3-4-5-6 are in the text

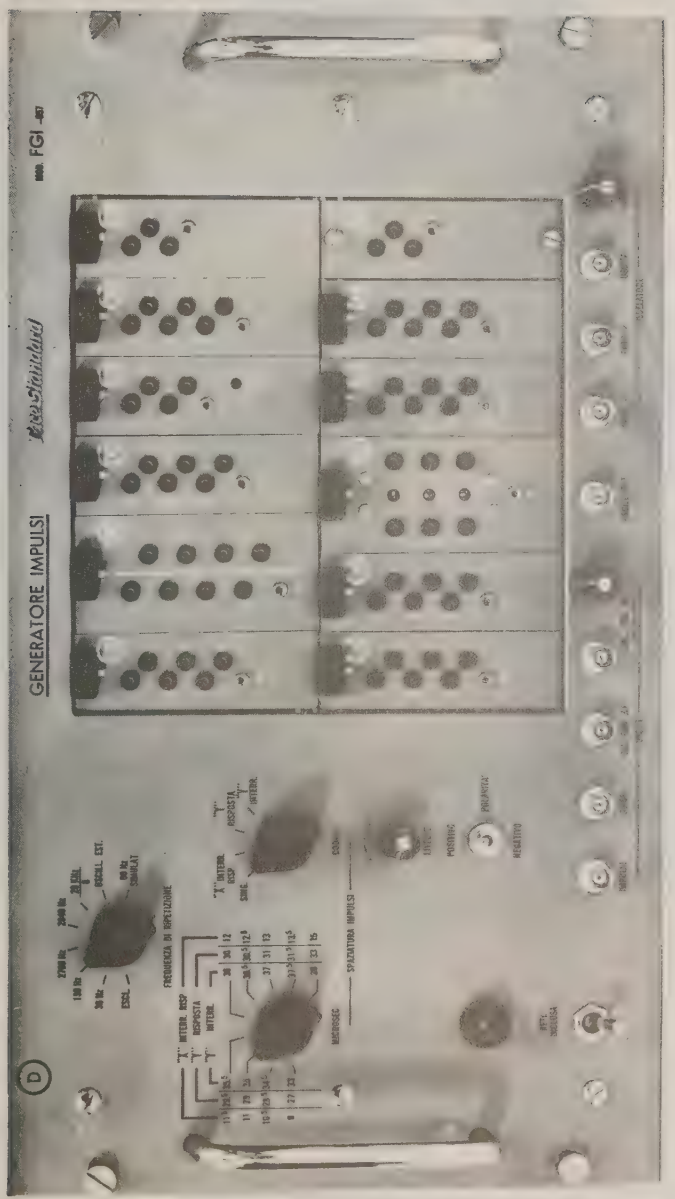


FIG.1

PULSE GENERATOR - FRONT VIEW

GENERATORE IMPULSI - VISTA FRONTALE

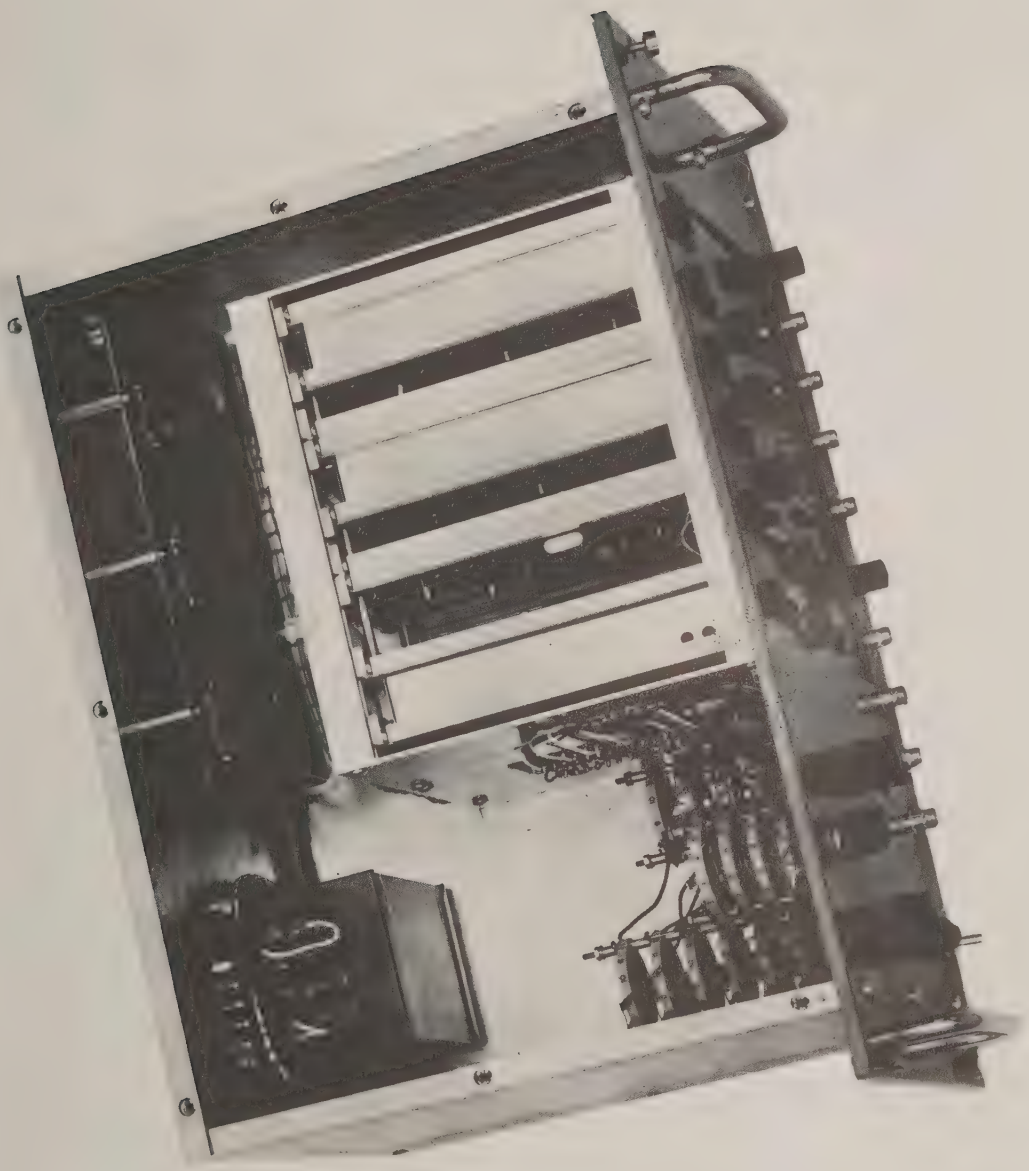
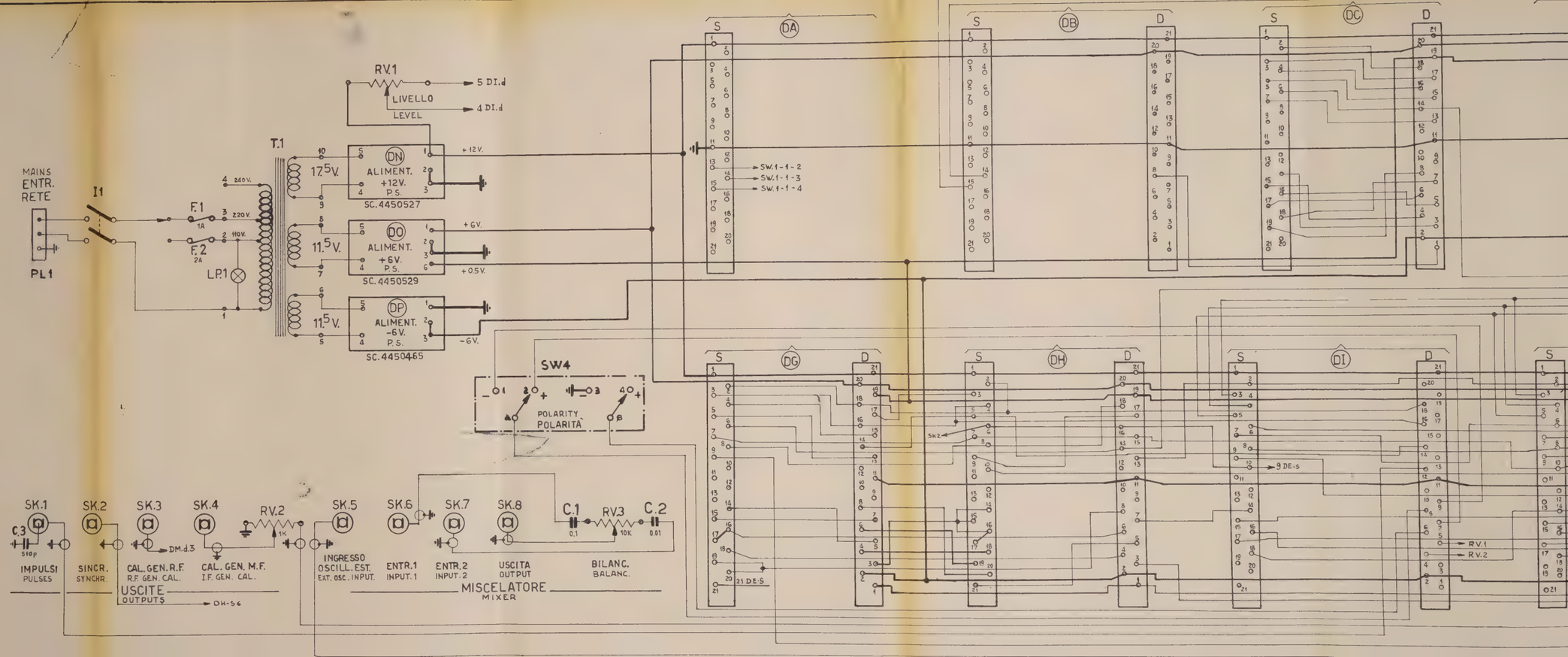
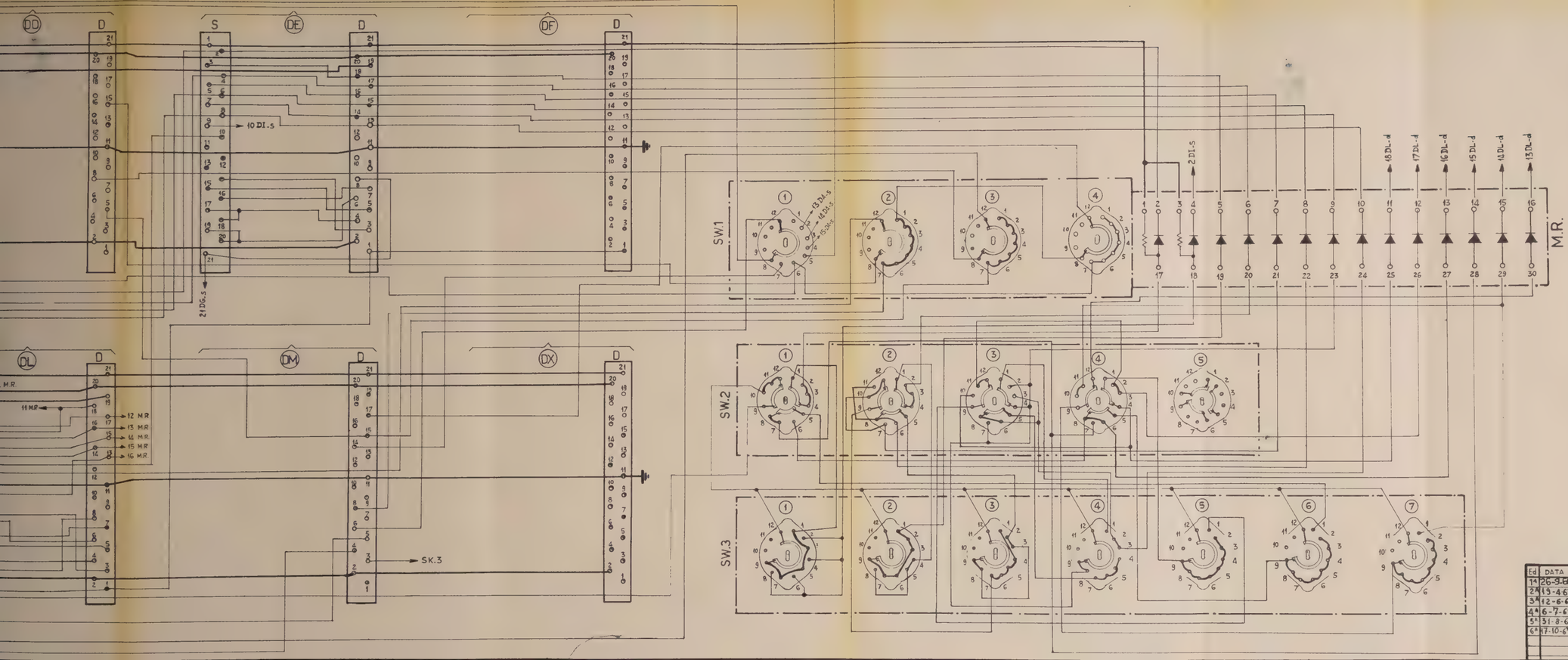


FIG.2

PULSE GENERATOR - UPPER VIEW

GENERATORE IMPULSI - VISTA SUPERIORE


RV.1
LIVELLO
LEVEL
5 DI.d
4 DI.d
T.1
MAINS
ENTR.
RETE
PL.1
I1
F.1
1A
F.2
2A
LP.1
240 V.
220 V.
110 V.
17.5 V.
11.5 V.
11.5 V.
DN
ALIMENT.
+12V.
P.S.
SC.4450527
DO
ALIMENT.
+6V.
P.S.
SC.4450529
DP
ALIMENT.
-6V.
P.S.
SC.4450465
+12V.
+6V.
+0.5V.
-6V.
SW4
POLARITY
POLARITÀ
SW.1-1-2
SW.1-1-3
SW.1-1-4
DA
DB
DC
DG
DH
DI
SK2
9 DE-S
21 DE-S
RV.1
RV.2
SK.1
SK.2
SK.3
SK.4
RV.2
SK.5
SK.6
SK.7
SK.8
C.1
RV.3
C.2
C.3
510p
1K
0.1
10K
0.01
DM.d.3
IMPULSI
PULSES
SINCR.
SYNCHR.
CAL. GEN. R.F.
R.F. GEN. CAL.
CAL. GEN. M.F.
I.F. GEN. CAL.
USCITE
OUTPUTS
DM-S6
INGRESSO
OSCILL. EST.
EXT. OSC. INPUT.
ENTR.1
INPUT. 1
ENTR.2
INPUT. 2
USCITA
OUTPUT
BILANC.
BALANC.
MISCELATORE
MIXER



DA-S	MULTIVIBRATORI 30 - 150 - 2700 Hz. MULTIVIBRATORS	SC. 4450542
DB-S	» 60 c 2850Hz.	» 4450553
DB-d	OSCILLATORE QUARZO 20 KHz. CRYSTAL OSCILLATOR	» 4450543
DC-S	GATES DIVISORE PER 8 GATES EIGHT DIVIDER	» 4450547
DC-d	FLIP-FLOP	» 4450544
DD-d	SIMULATORE SIMULATOR	» 4450461
DE-S	GATES	» 4450548
DE-d	FLIP-FLOP CONTATORE SPAZIATURA FLIP-FLOP SPACING COUNTER	» 4450545
DF-d	OROLOGIO 2MHz. 2Mc/s CLOCK	» 4450546
DG-S	GATES	» 4450549
DG-d	FLIP-FLOP CONTATORE SPAZIATURA FLIP-FLOP SPACING COUNTER	» 4450545
DH-S	GATES	» 4450552
DH-d	FLIP-FLOP CONTATORE SPAZIATURA FLIP-FLOP SPACING COUNTER	» 4450545
DI-S	GATES	» 4450550
DI-d	FORMATORE SHAPER	» 4450554
DL-S	GATES	» 4450551
DL-d	FLIP-FLOP CONTATORE SPAZIATURA FLIP-FLOP SPACING COUNTER	» 4450545
DM-d	SQUADRATORI SQUARER	» 4450555
DX-d	UNITA CONDENSATORI CONDENSER UNIT	» 4450556

D

Ed	DATA	RIFERIMENTI
TA	26-3-66	
2A	15-4-67	
3A	12-6-67	
4A	6-7-67	
5A	31-8-67	
6A	17-10-69	

STRUM. D.M.E.

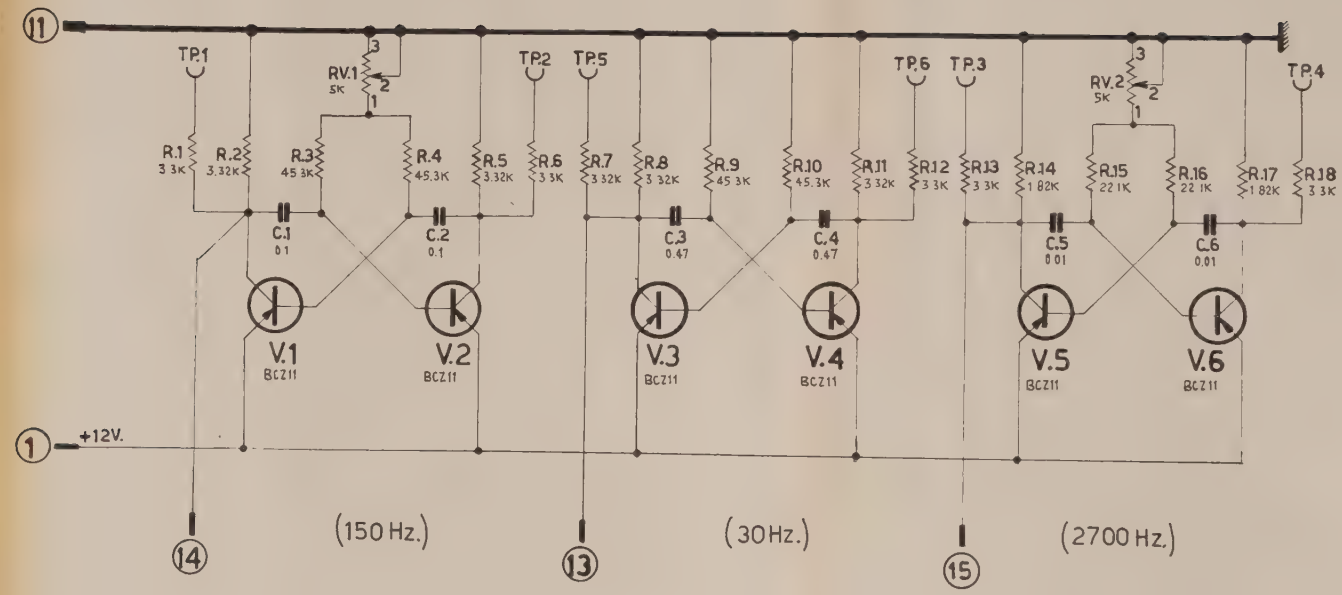
TM. 626/A | FIG.7

Face Standard

PULSE GENERATOR
GENERATORE IMPULSI

SCALA
LUC. | DIS. Carlo
CONF. | APP.

SC.1450057



DA.S

Ed.	DATA	RIFERIMENTI
1ª	13-7-66	
2ª	4-7-67	

STRUM. D.M.E

TM. 626/A

FIG. 8

Face Standard

MULTIVIBRATORS
MULTIVIBRATORI
30Hz.-150Hz.-2700Hz

SCALA

LUC. | DIS. Cartelle

CONT. | APP.

SC. 4450452

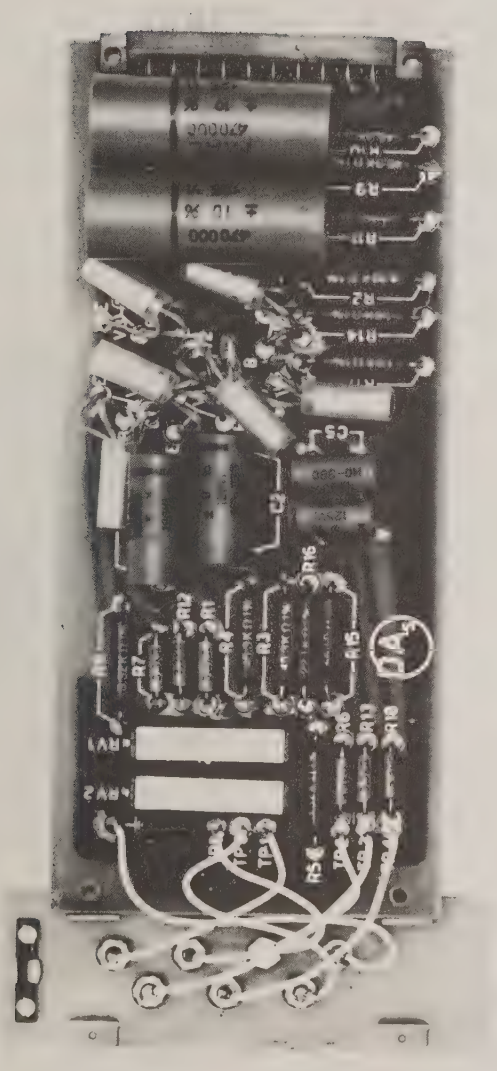


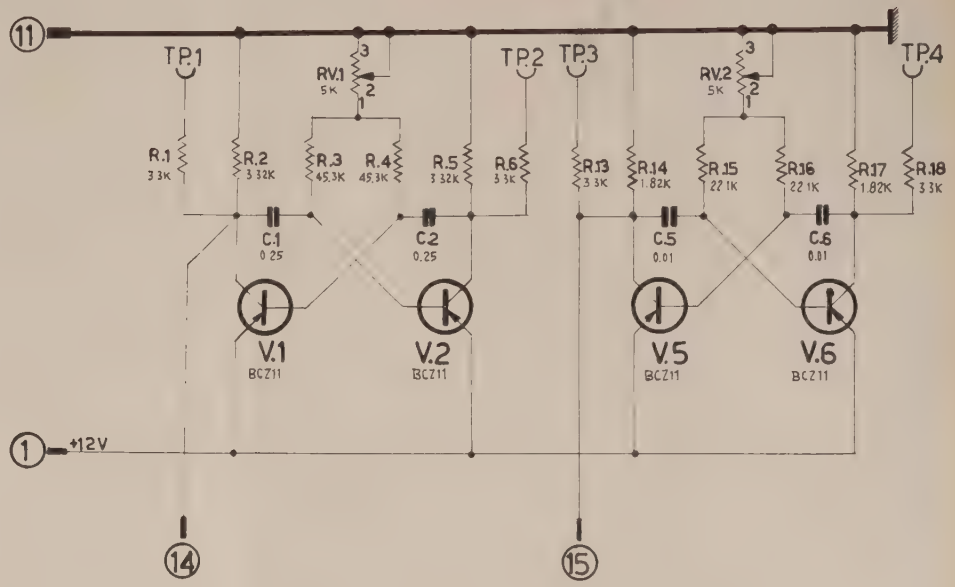
FIG.8a

MULTIVIBRATOR (DA) - INTERNAL VIEW

/A

MULTIVIBRATORE (DA) - VISTA INTERNA

SC. 4450553 TAV. 1-4



DB.s

Ed.	DATA	RIFERIMENTI
1A	14-7-66	
2A	4-7-67	

STRUM. D.M.E.

IMP.

TM. 626/A | FIG. 9

Face Standard

MULTIVIBRATORS
MULTIVIBRATORI
60Hz.-2850Hz.

SCALA

LUC. | DIS Canteri

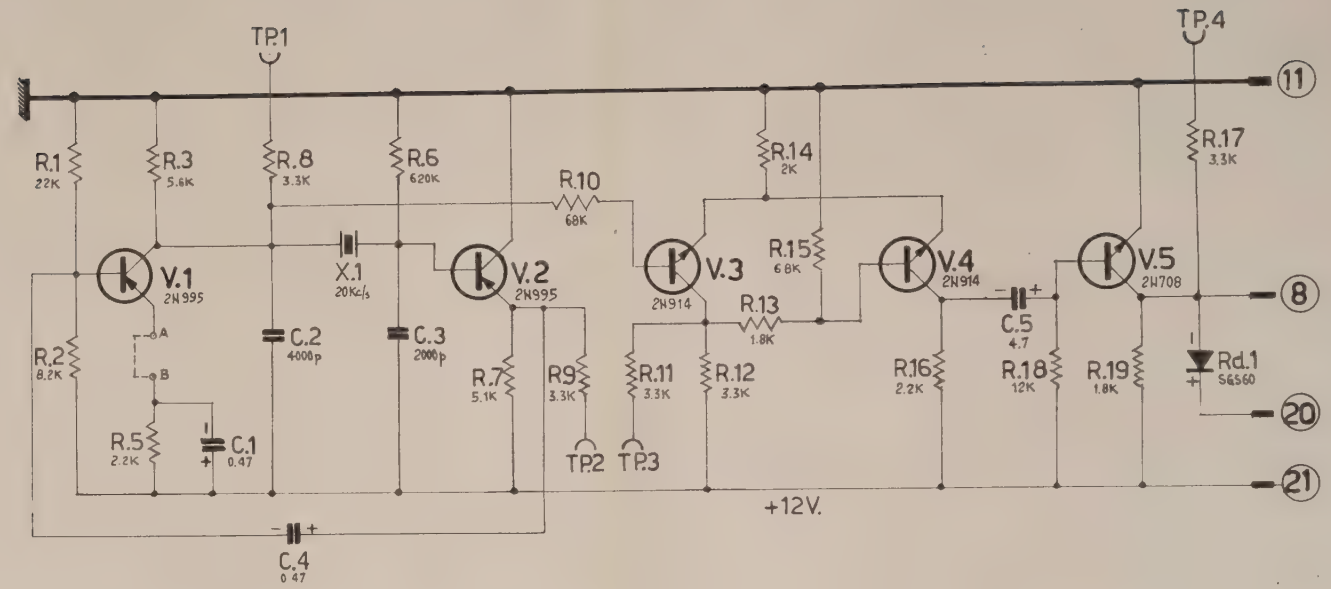
COMM. | APP.

SC. 4450553 | TAV. 1-4

A termini di legge la Face Standard S.p.A. si riserva la proprietà di questo documento con divieto di riprodurlo o di renderlo comunque noto a terzi senza sua autorizzazione scritta.

SC. 4450543 TAV. 1-2

RCONI



DB.d

Ed.	DATA	RIFERIMENTI
1ª	18-7-66	
2ª	4-7-67	
3ª	8-9-67	

STRUM. D.M.E.

TM. 626/A | FIG. 10

Face Standard

20 Kc/s CRYSTAL OSCILLATOR

OSCILLATORE 20 KHz. QUARZO

SCALA

LUC. | DIS. Cadeau

CONT. | APP.

SC. 4450543

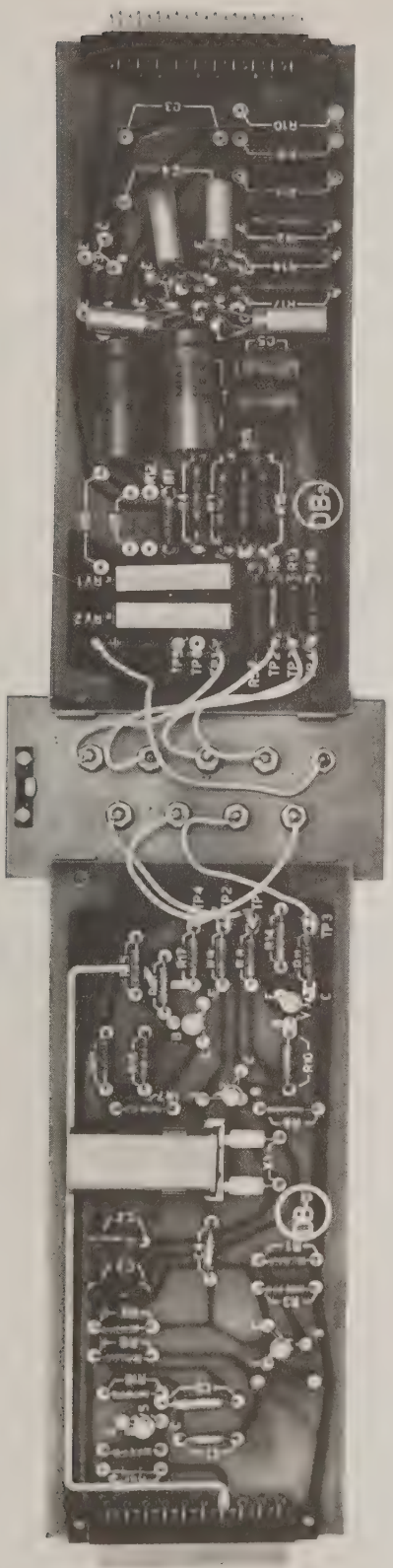
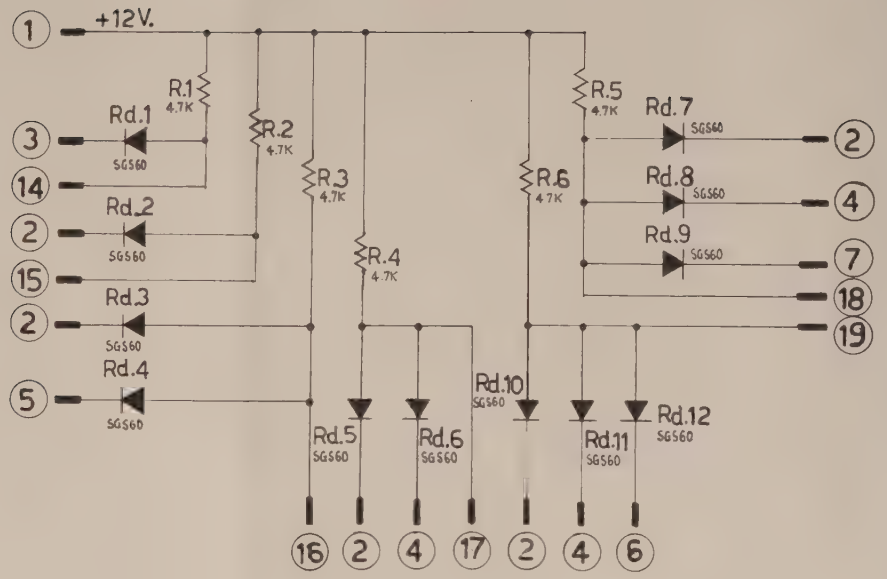


FIG.10a

20 Ko/s CRYSTAL OSCILLATOR (DB) - INTERNAL VIEW

OSCILLATORE A CRISTALLO 20 KHz (DB) - VISTA INTERNA

.626/A
.626



DCs

Ed.	DATA	RIFERIMENTI
1ª	22-8-66	
2ª	4-7-67	

STRUM. D.M.E.

IMP.

TM. 626/A

FIG. 11

DIVIDER FOR 8
GATES
DIVISORE PER 8

Face Standard

SCALA

LUC. DIS.

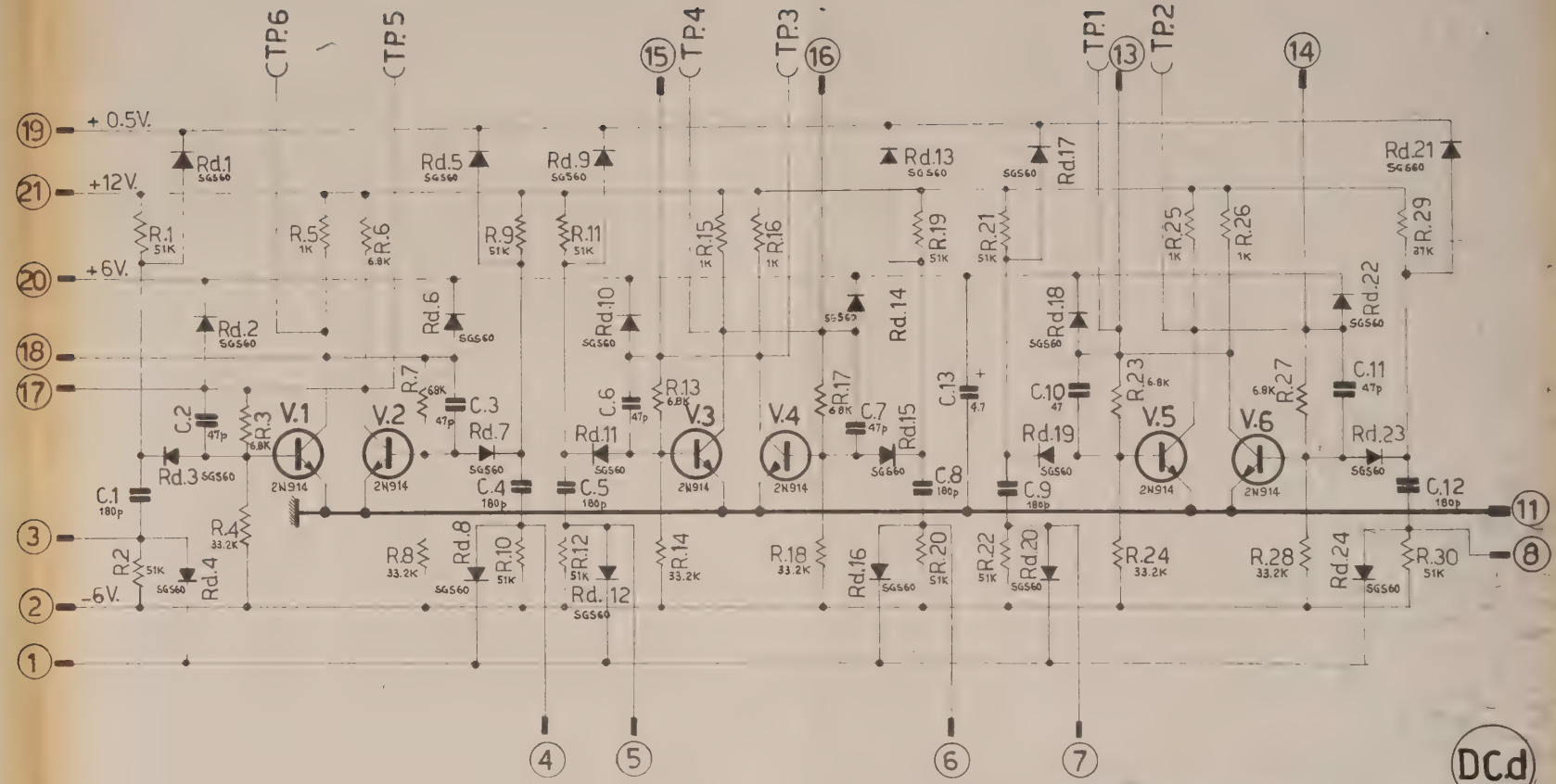
CONT. APP.

SC. 4450547 TAV. 1-2

SC. 4450547 TAV. 1-2

T.C.
ARCONI

Mod. 10 - C - T 751 - 4010



Ed	DATA	RIFERIMENTI
1ª	2-9-66	
2ª	5-6-67	
3ª	4-7-67	

STRUM. D.M.E

TM. 626/A

FIG. 12

Face Standard

SCALA

LUC

DIS

CONT

FLIP-FLOP

SC.4450544 TAV. 1-6

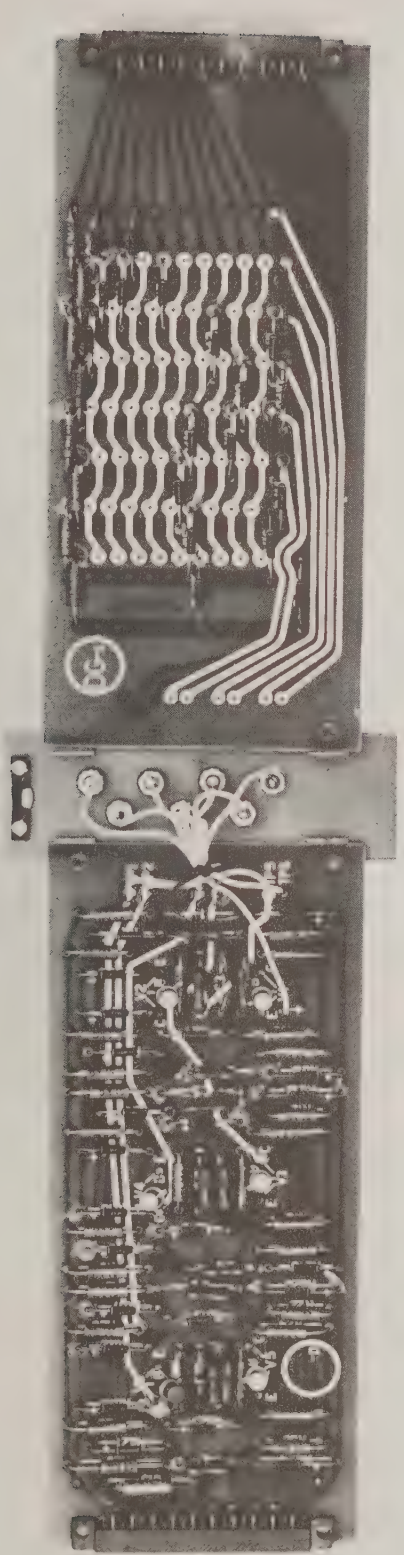
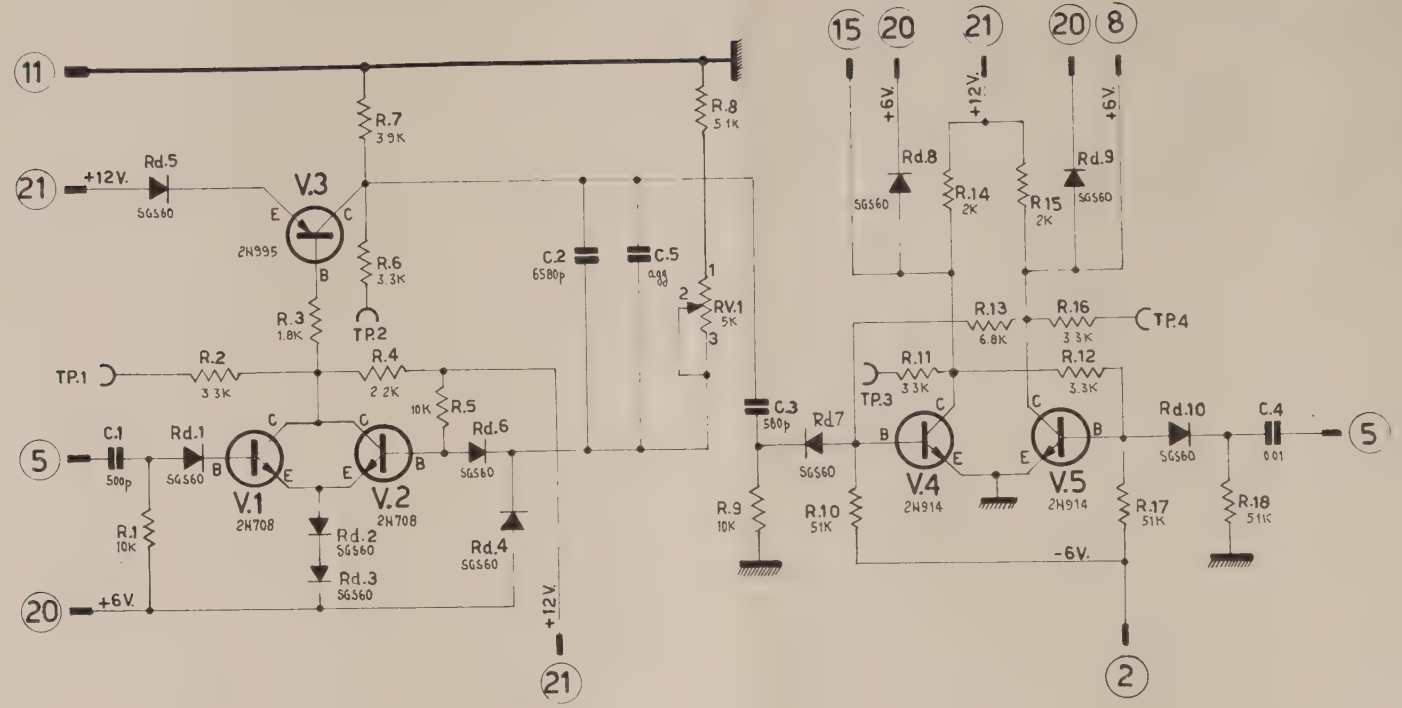


FIG. 12a

FLIP-FLOP (DC) - INTERNAL VIEW

FLIP-FLOP (DC) - VISTA INTERNA

SC.4450561



DDd

Ed.	DATA	RIFERIMENTI
1ª	1-8-66	
2ª	19-12-66	
3ª	4-7-67	

STRUM. D.M.E

TM.626/A | FIG. 13

Face Standard

PULSE SIMULATOR

SIMULATORE IMPULSI

SCALA

LUC. | DIS

CONF. | APP.

SC.4450561

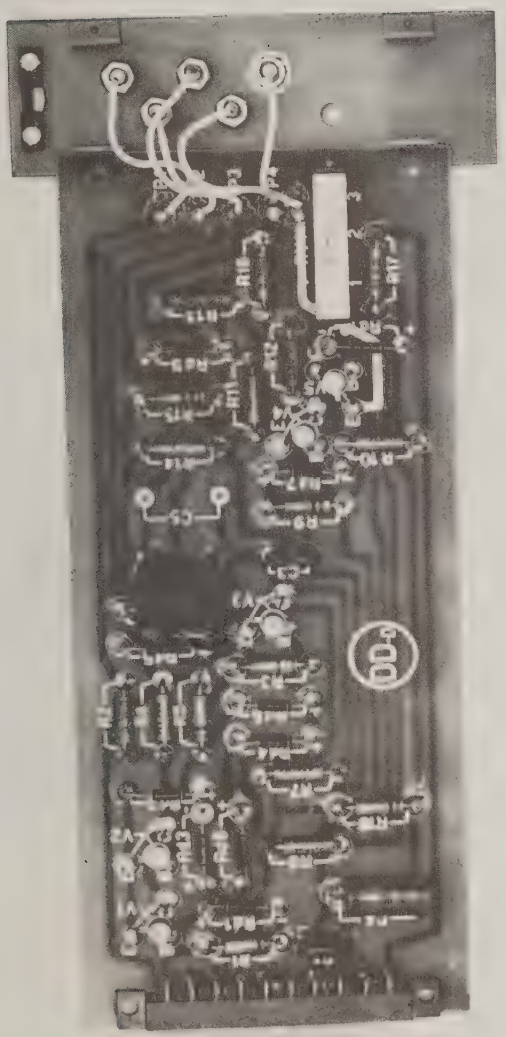
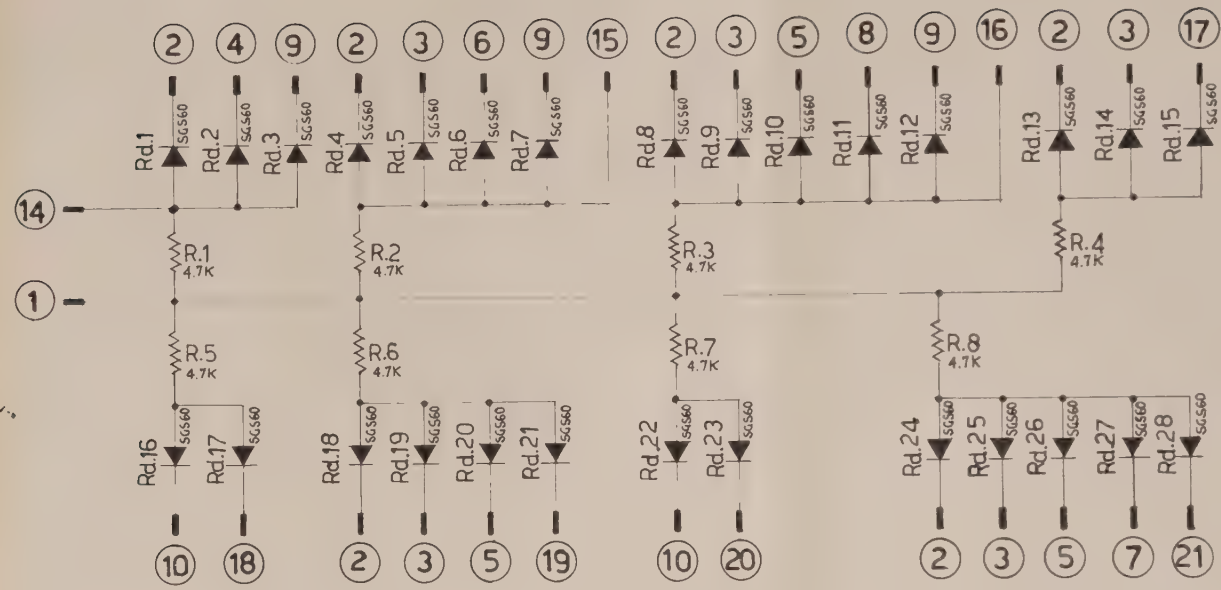


FIG. 13a

SIMULATOR (DD) - INTERNAL VIEW

SIMULATORE(DD) - VISTA INTERNA

SC. 4450548



DES

Ed.	DATA	RIFERIMENTI
1ª	3-8-66	
2ª	4-7-67	

STRUM. D.M.E

TM. 626/A | FIG. 14

Fuce Standard

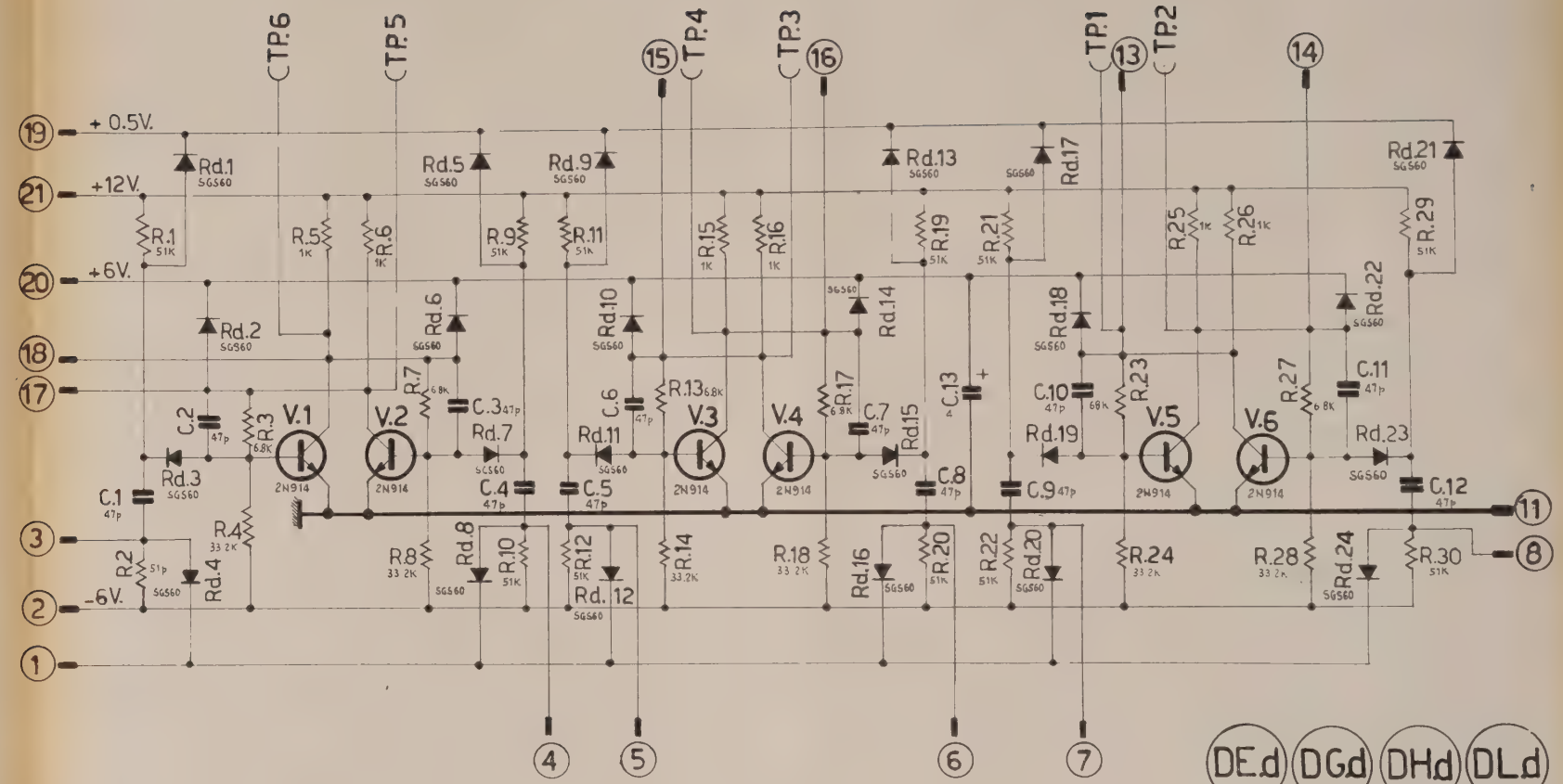
GATES

SCALA

LUC. 1 | DIS

CONTR. | APP.

SC.4450548



Ed.	DATA	RIFERIMENTI
1ª	2-9-66	
2°	5-6-67	
3ª	[illegible]	

STRUM. D.M.E.

TM. 626/A

FIG. 15

Fuce Standard

SCALA

LUC. | DIS. Carta

CONT. | APP.

FLIP_FLOP

SC.4450545

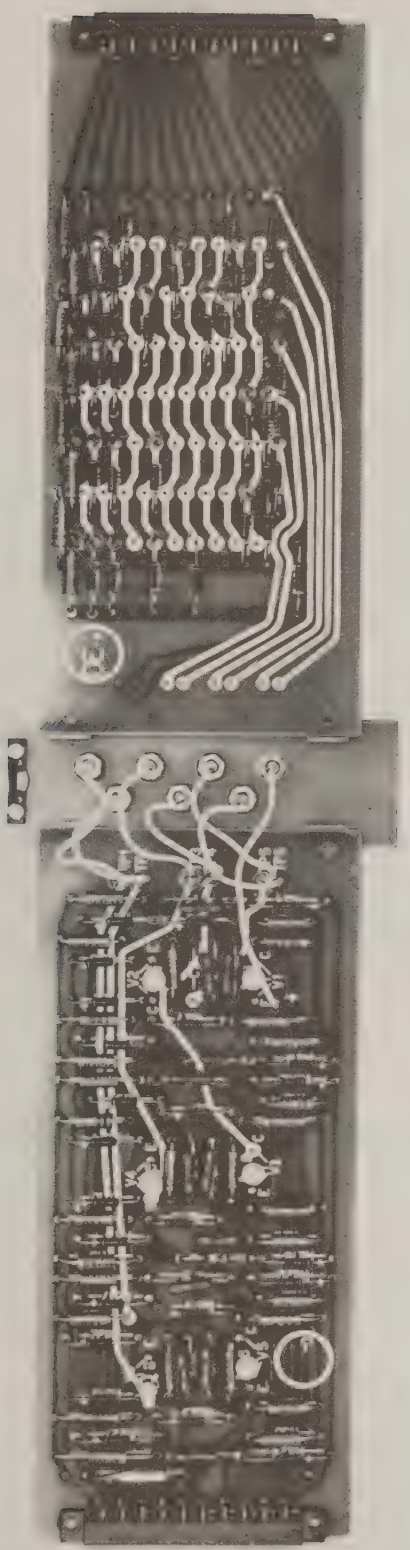


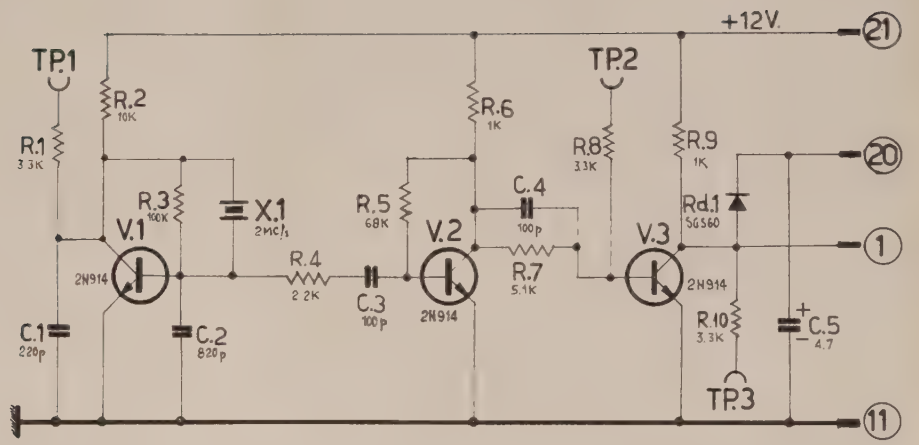
FIG. 15a

FLIP-FLOP (DE) - INTERNAL VIEW

FLIP-FLOP (DE) - VISTA INTERNA

SC.4450546 TAV. n-3

S.T.C. MARCONI



DF.d

Ed	DATA	RIFERIMENTI
1ª	15-7-66	
2ª	4-7-67	

STRUM. D.M.E.

IMP.

TM. 626/A | FIG. 16

2Mc/s CLOCK
OROLOGIO 2Mc/s

Face Standard

SCALA

LUC. | DIS. Cattaneo

C. Bottaro | VISTO

SC.4450546 TAV. n-3

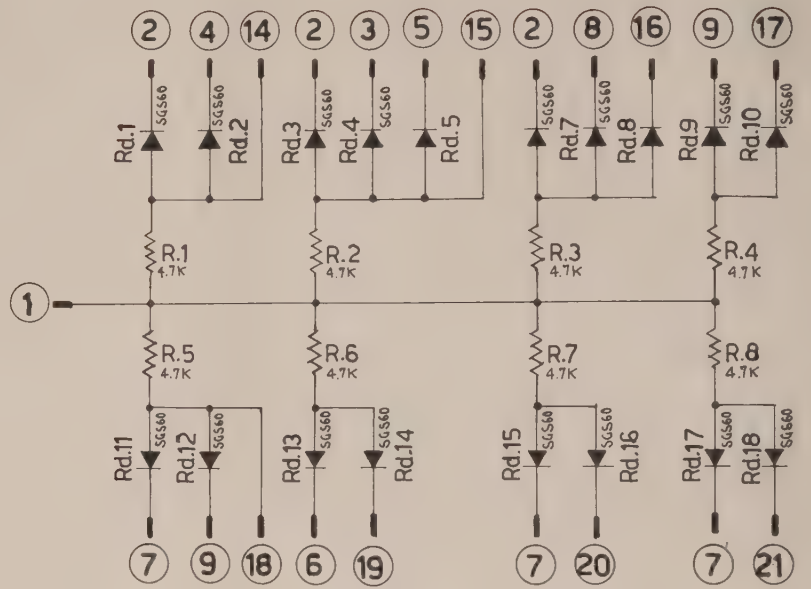
A norma di legge, Face Standard Soc. p. Az. si riserva la proprietà di questo disegno con divieto di riprodurlo e di renderlo conoscere, sia a terzi sia, nel caso concorrenziale, alla parte.

FIG. 16a

2 Mc/s CLOCK (DF) - INTERNAL VIEW

OROLOGIO 2 MHz (DF) - VISTA INTERNA

SC.4450549 TAV. 1-2



DG.S

Ed	DATA	RIFERIMENTI
1ª	26-7-66	
2ª	4-7-67	

STRUM. D.M.E

IMP.

TM. 626/A FIG. 17

GATES

Face Standard

SCALA

LUC. DIS. Contessa

CONTR. APP.

SC.4450549 TAV. 1-2

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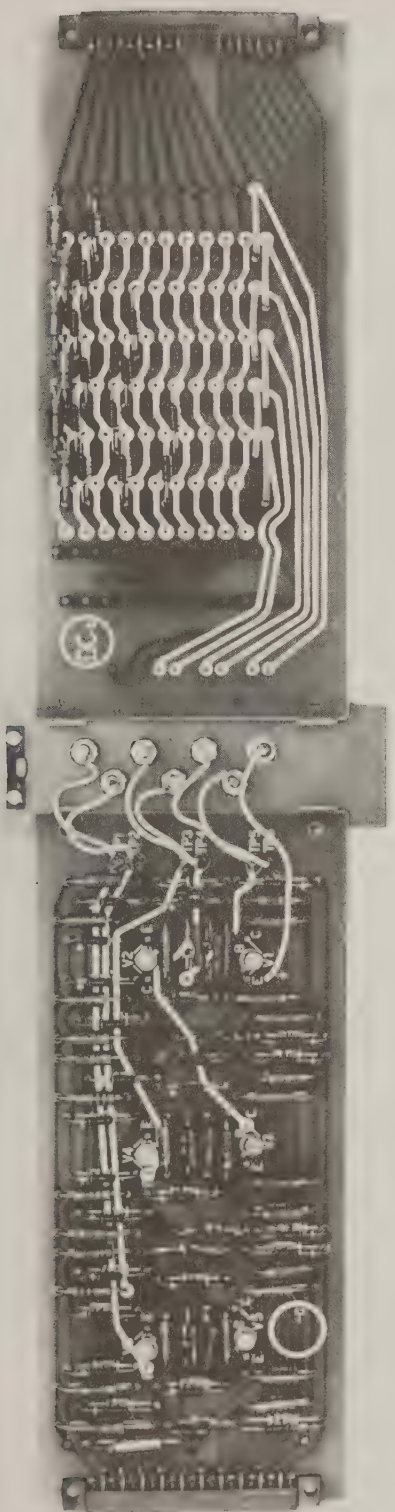


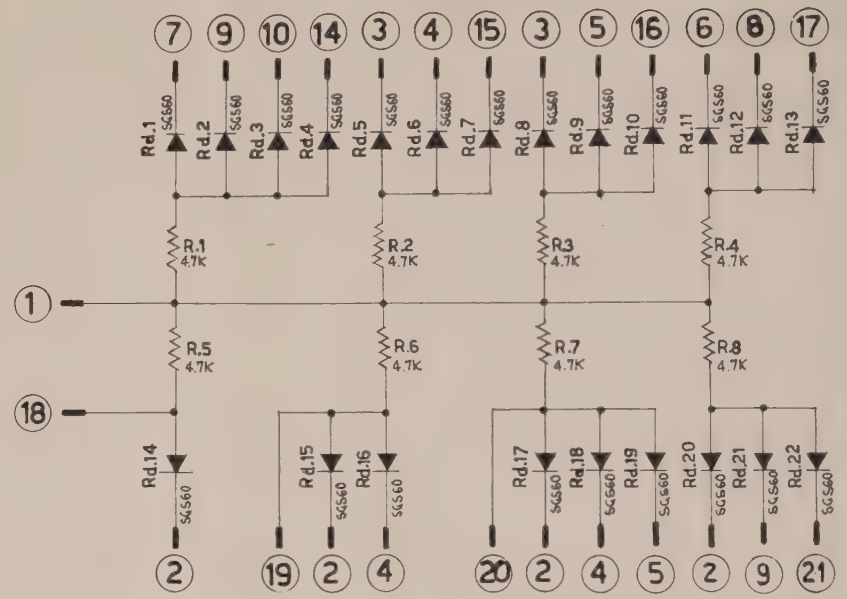
FIG.17a

GATES (DG) - INTERNAL VIEW

GATES (DG) - VISTA INTERNA

SC. 4450552 TAV. 1-2

S.T.C. MARCONI



DH.s

Ed.	DATA	RIFERIMENTI
1ª	25-7-66	
2ª	4-7-67	

IMP. STRUM. D.M.E

TM. 626/A | FIG. 18

Face Standard

GATES

SCALA

LUC. | DIS Castelli

COM. | APP.

SC.4450552 TAV. 1-2

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Mod. 10 - C. T. - 751 - 9874010

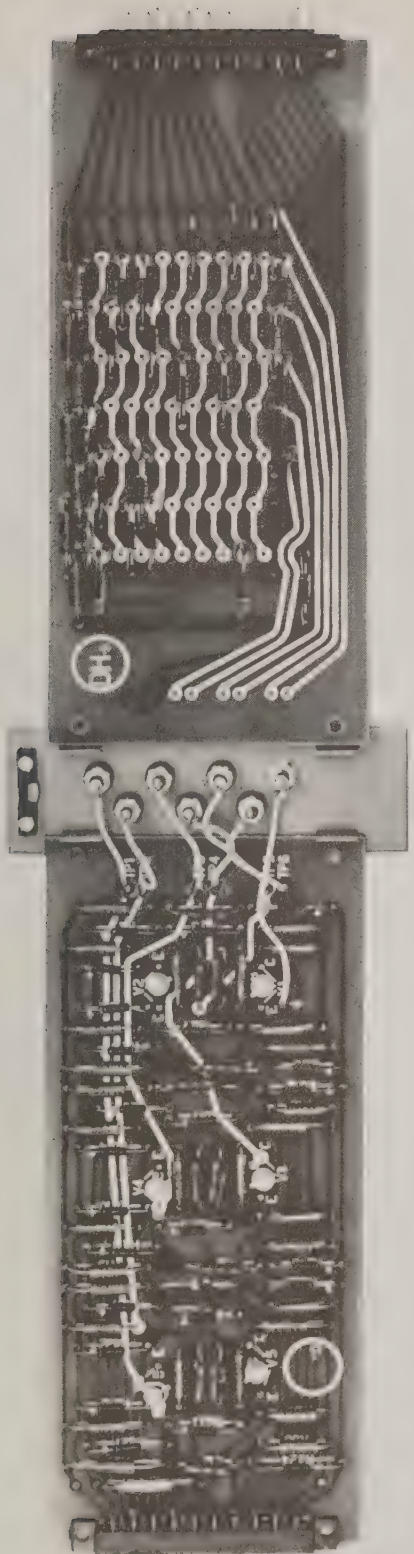


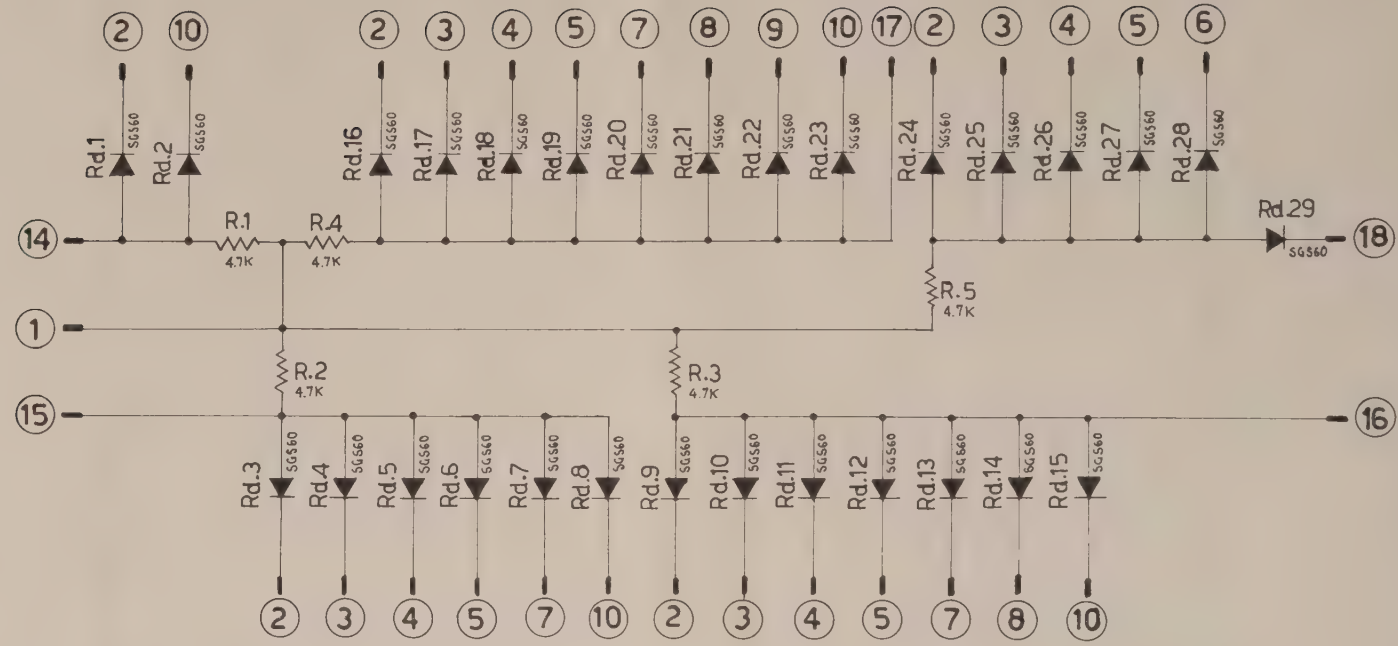
FIG. 18a

GATES (DH) - INTERNAL VIEW

GATES (IH) - VISTA INTERNA

SC.4450550 | TAV. 1-2

CONI



DI.s

Ed.	DATA	RIFERIMENTI
1ª	19-7-66	
2°	5-6-67	
3ª	4-7-67	

STRUM. D.M.E.

TM. 626/A | FIG. 19

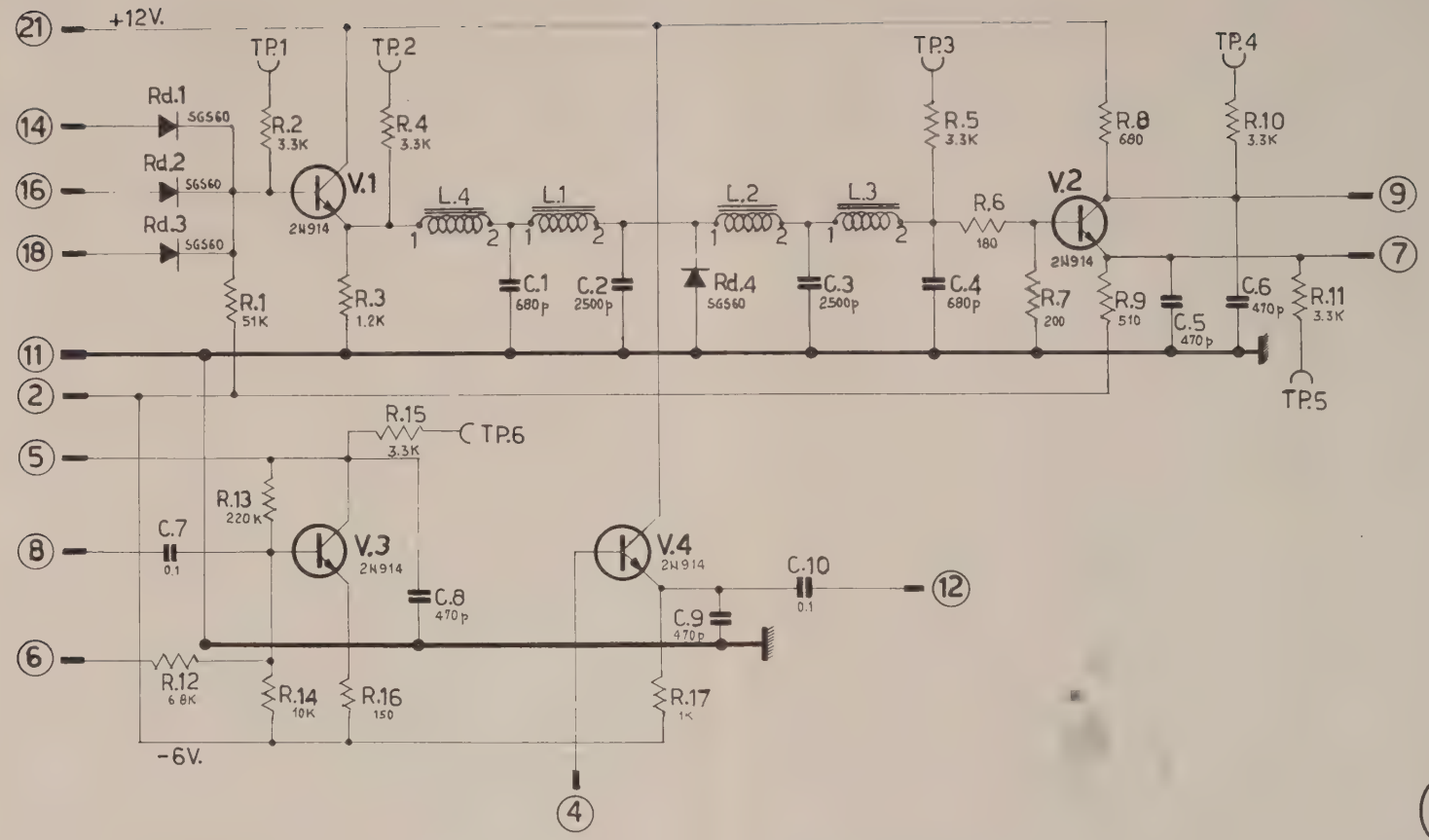
Fuce Standard

GATES

SCALA

LUC. | DIS.

CONT. | APP.



DI.d

Ed.	DATA	RIFERIMENTI
1ª	21-7-66	
2ª	5-6-67	
3ª	4-7-67	
4ª	26-7-67	

STRUM. D.M.E

IMP.

TM. 626/A

FIG. 20

SHAPER
FORMATORE

Face Standard

SCALA

LUC. DIS.

CONT. APP.

SC.4450554

SC.4450554 TAV. 1-5

C.
RCONI

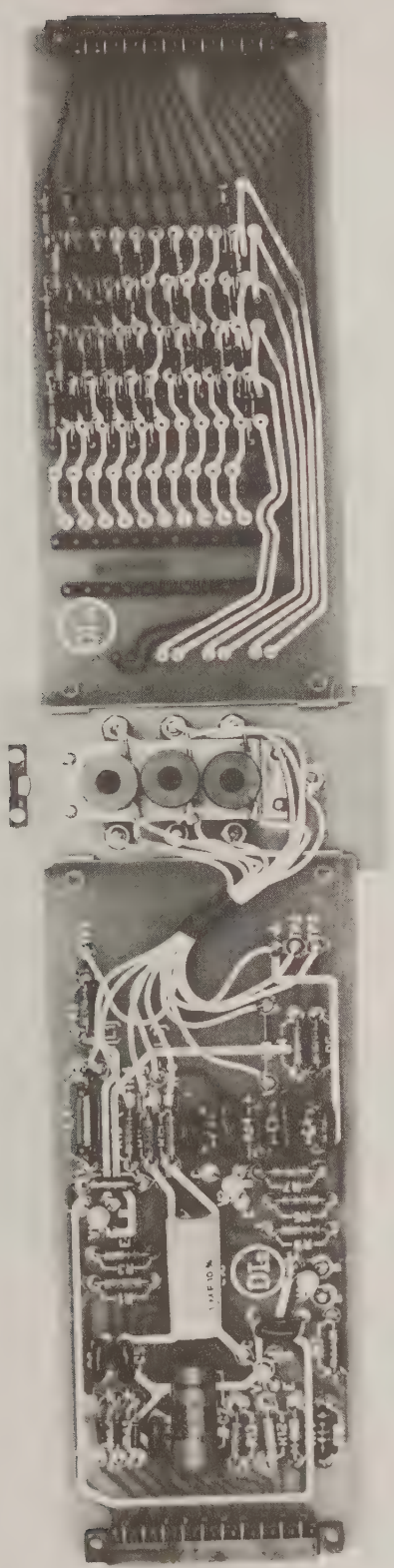


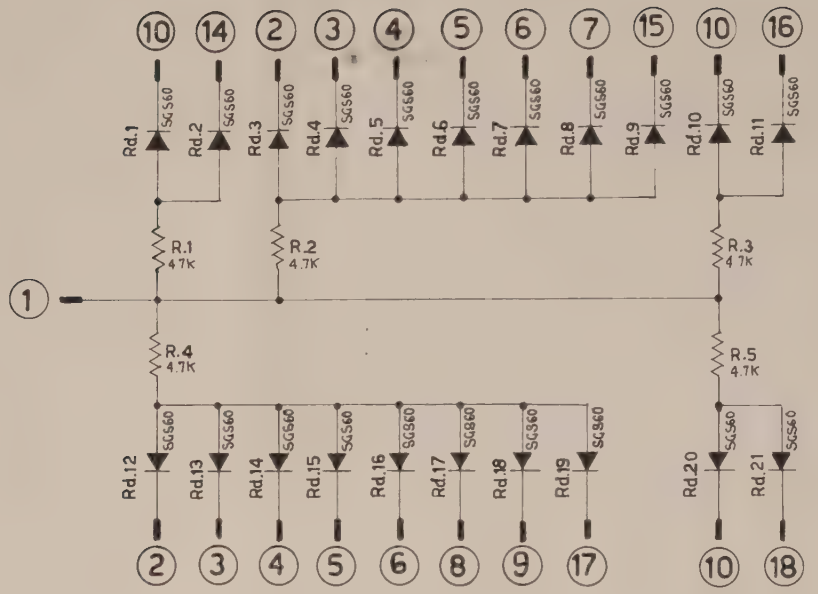
FIG.20a

SHAPER (DI) - INTERNAL VIEW

FORMATORE (DI) - VISTA INTERNA

SC. 4450551 TAV. 1-2

S.T.C. MARCONI



DL.s

Ed.	DATA	RIFERIMENTI
1ª	26-7-66	
2°	5-6-67	
3ª	4-7-67	

IMP. STRUM. D.M.E.

TM. 626/A | FIG. 21

GATES

Face Standard

SCALA

LUC. DIS. Castelli

CONT. APP.

SC.4450551 TAV. 1-2

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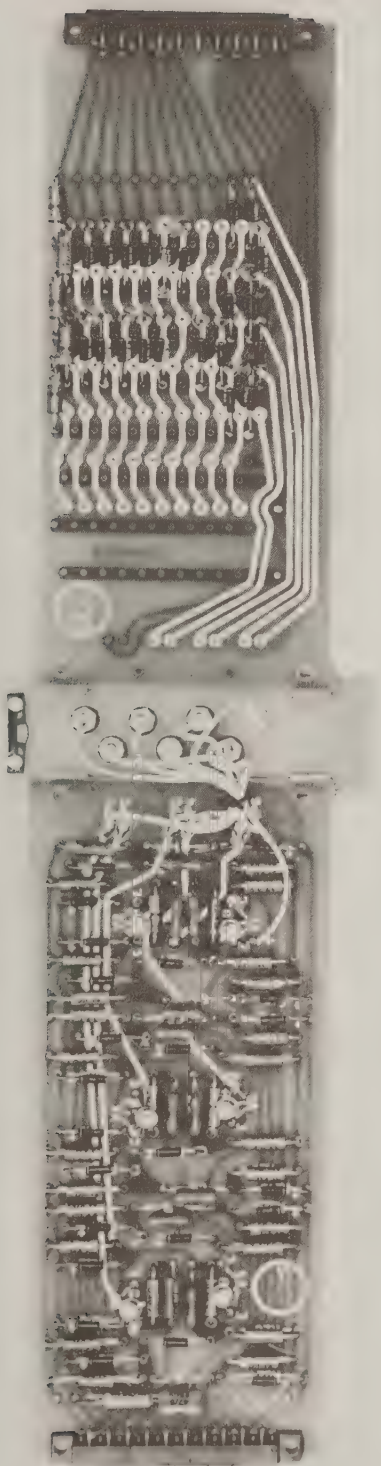


FIG.21a

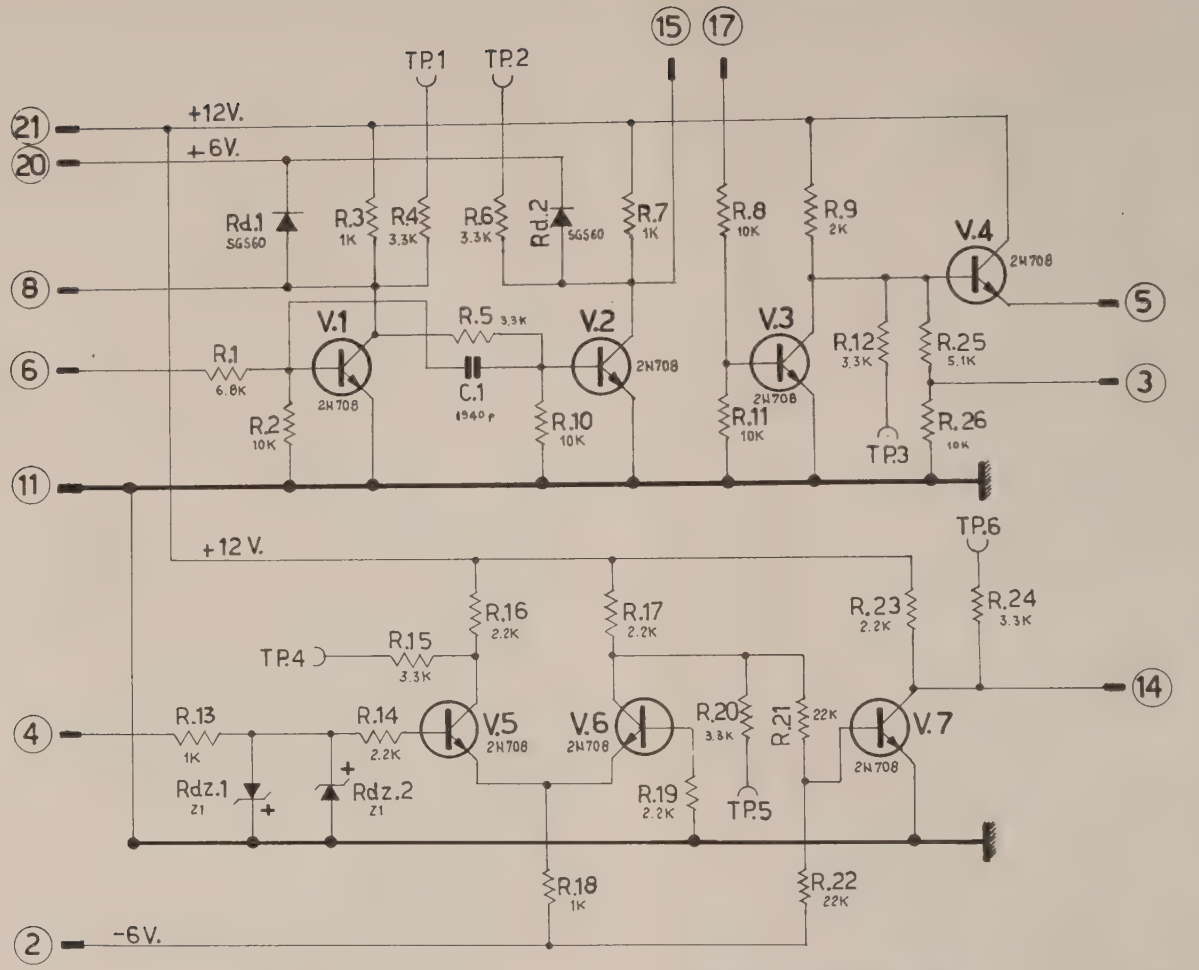
GATES (DL) - INTERNAL VIEW

GATES (DL) - VISTA INTERNA

/A

SC.4450555

T.C.
ARCONI



DM.d

Ed.	DATA	RIFERIMENTI
1ª	19-7-66	
2ª	4-7-67	
3ª	26-7-67	

STRUM. D.M.E

IMP.

TM. 626/A | FIG. 22

Face Standard

SQUARERS
SQUADRATORI

SCALA

LUC. | DIS

APP.

SC.4450555

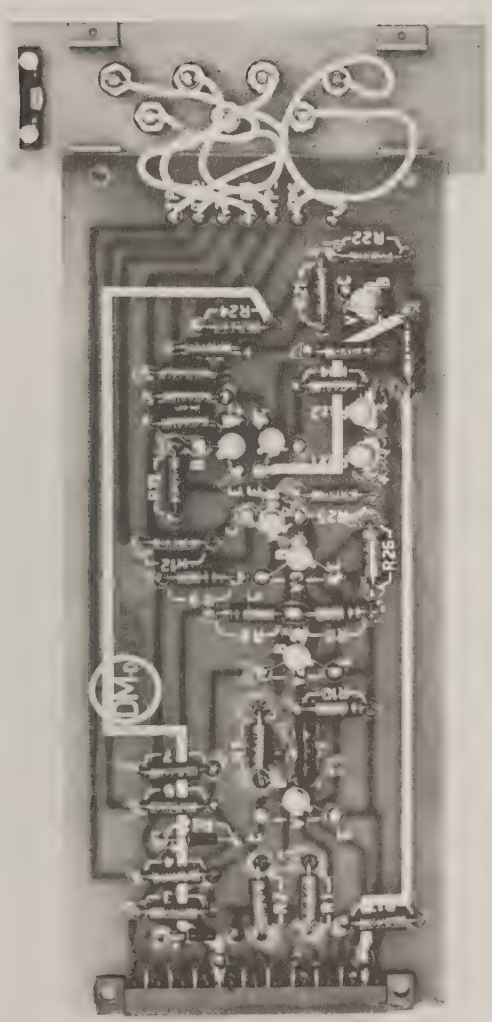


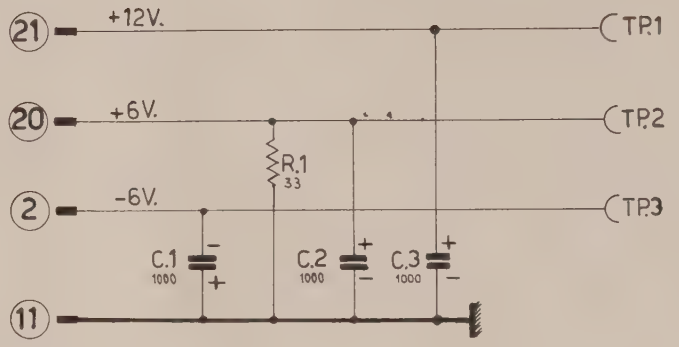
FIG.22a

SQUARER (DM) - INTERNAL VIEW

SQUADRATORE (DM) - VISTA INTERNA

SC. 4450556 TAV. 1-2

S.T.C.
MARCONI



DXd

Ed	DATA	RIFERIMENTI
1ª	26-7-66	
2ª	4-7-67	

STRUM. D.M.E

TM. 626/A | FIG. 23

CONDENSER UNIT
UNITÀ CONDENSATORI

Face Standard

SCALA
LUC. DIS.
CONT. APP.

SC. 4450556 TAV. 1-2

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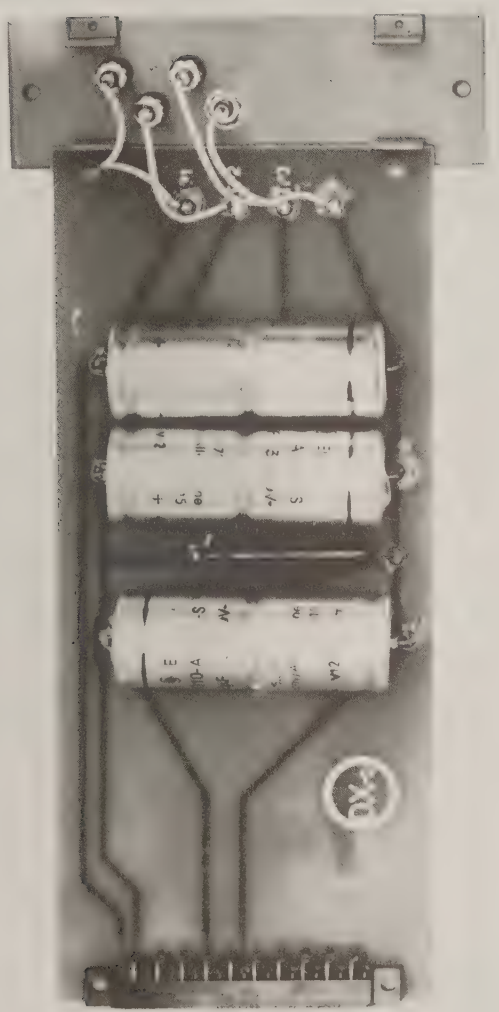
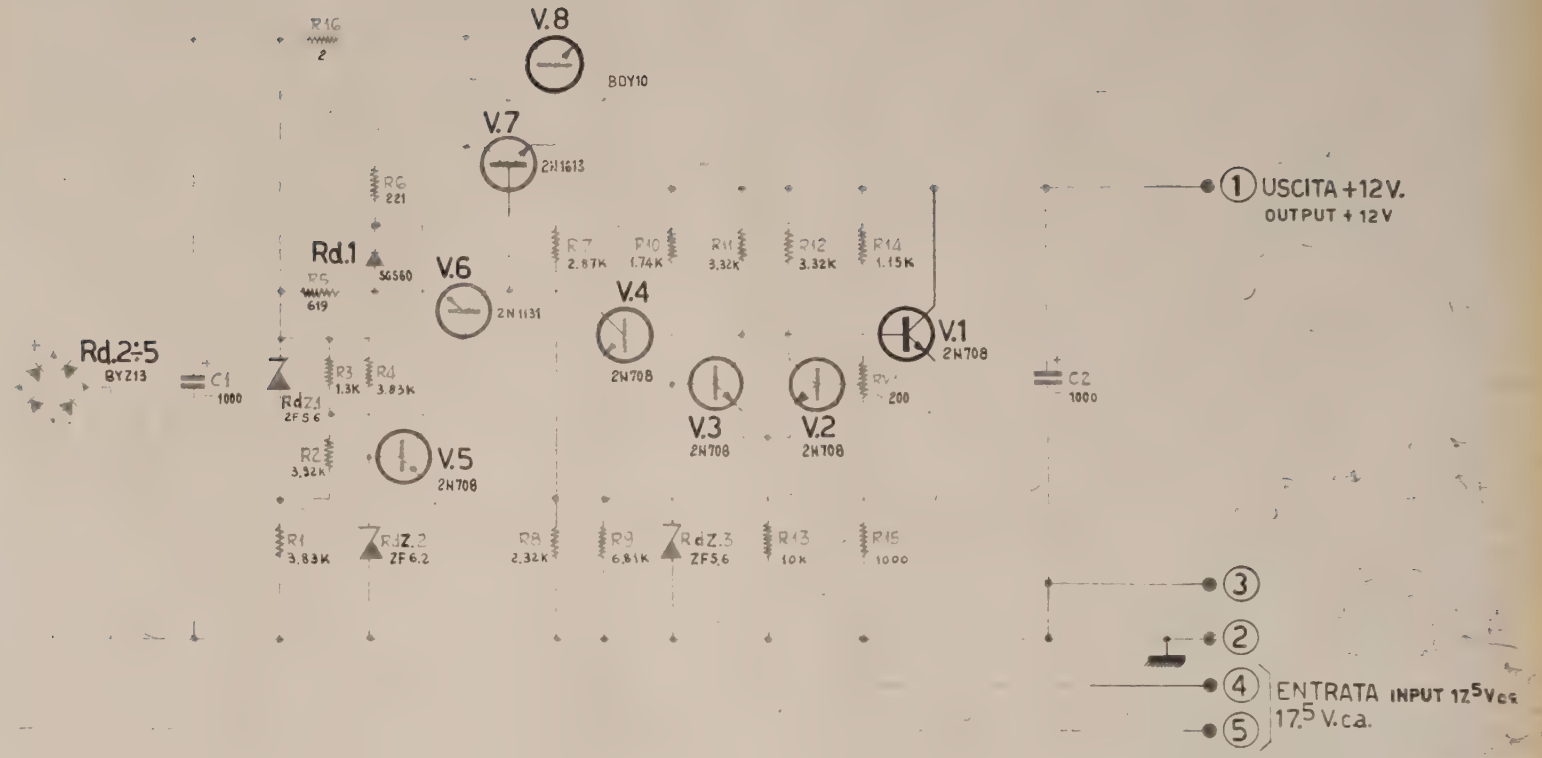


FIG.23a

FILTER UNIT (DX) - INTERNAL VIEW

FILTRO (DX) - VISTA INTERNA

SC.4450527 TAV. 1:4

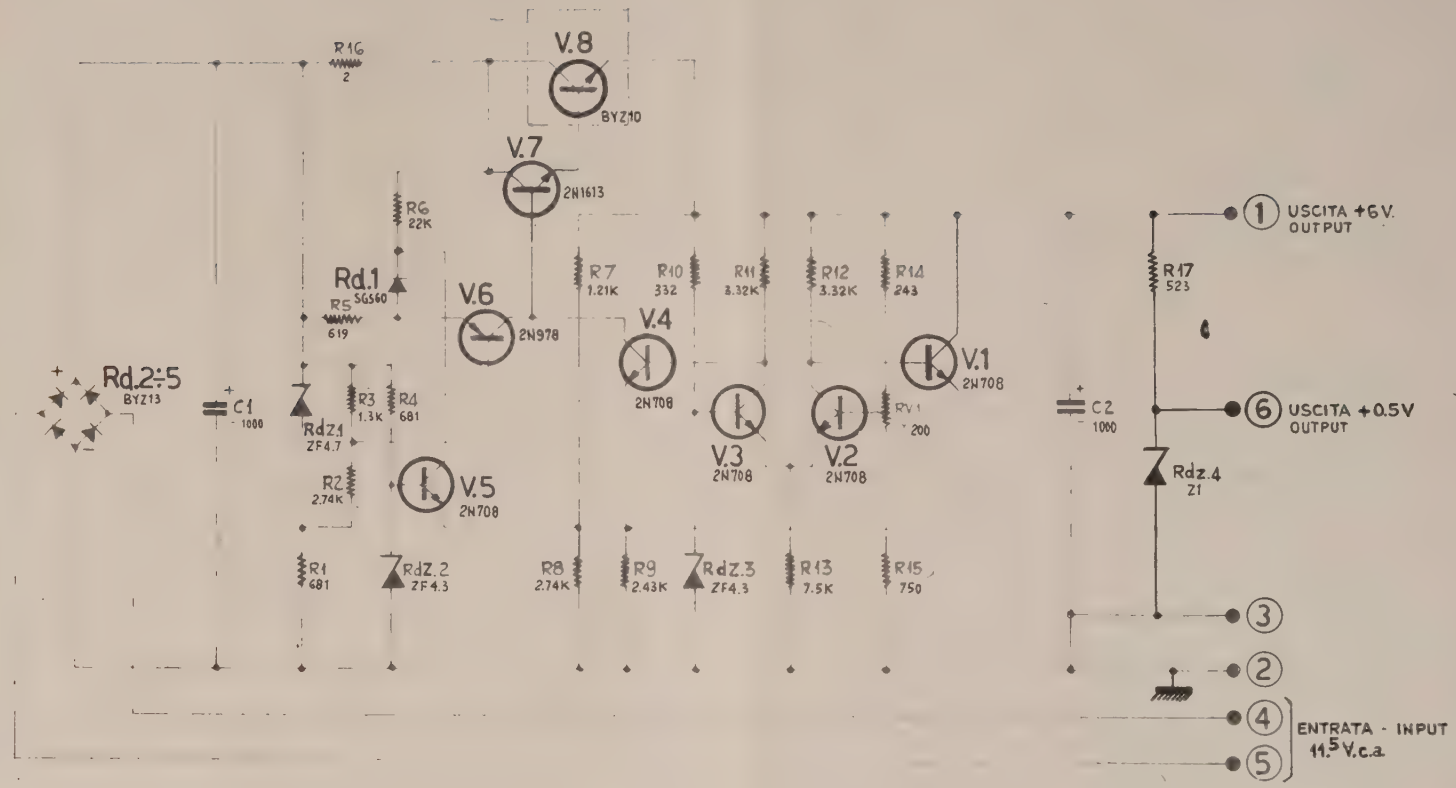


DN

TM. 626/A - FIG. 24

6-5-66		TM. 632/A	FIG. 7
2ª 4-7-67	STRUM. DME	+ 12V STAB. SUPPLY. UNIT	
3ª 26-7-67		ALIMENTATORE B.T. +12V. STABILIZZATO	SC.4450527

SC. 4450529 TAV. 1-4



D0

Ed.	DATA	RIFERIMENTI
1ª	12-9-66	
2ª	4-7-67	

STRUM. DME

TM. 626/A | FIG. 25

+6V. STAB. SUPPLY UNIT

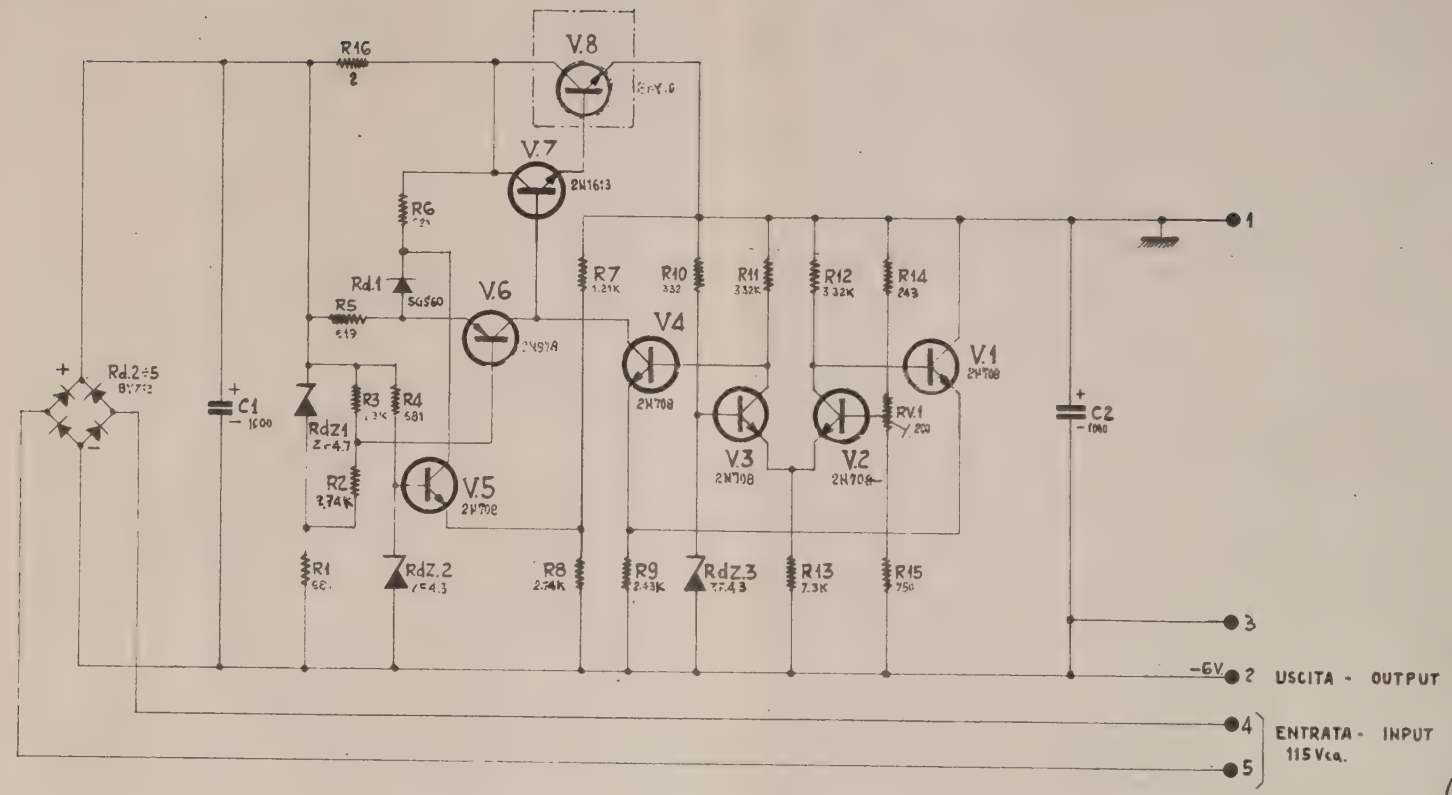
ALIMENTATORE B.T.
+6V. STABILIZZATO

Face Standard

SCALA

DIS.	
CONT.	APP.

SC.4450529



DP GENE IMP.

BB DME

-6V STABILIZED SUPPLY

Ed.	DATA	RIFERIMENTI
1A	3-9-65	
2A	3-2-66	
3A	6-6-67	

DME

TM. 567 FIG. 3.15
TM. 626/A FIG. 26

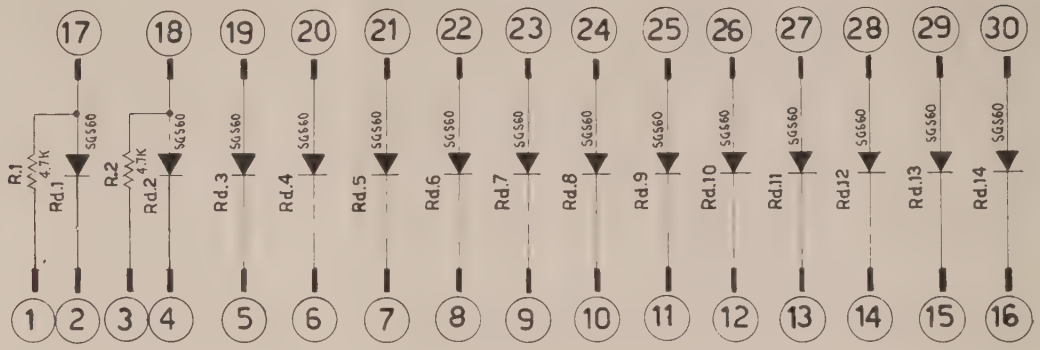
ALIMENTATORE B.T.
-6V

Face Standard

SCALA
LUC. DIS.
CONT. APP.

SC.4450557 TAV. 1-2

S.T.C. MARCONI



Ed.	DATA	RIFERIMENTI
1ª	2-8-66	
2ª	4-7-67	

STRUM. D.M.E.

TM. 626/A FIG. 27

DIODE UNIT

UNITÀ DIODI

Face Standard

SCALA

LUC. DIS. Costanzo

COMM. APP.

SC.4450557 TAV. 1-2

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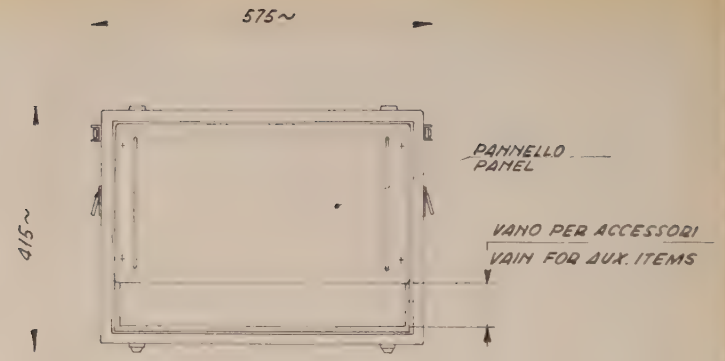

FIG. 28

Ed	DATA	RIFERIMENTI
1°	11-5-67	

GENERAT. IMPULSI MOD. FG1-057 IN COFANO METALL. TRASPORTAB.

—o—

PULSE GENERAT. MOD. FG1-057 IN TRANSPORTABLE METAL CABINET

Fluke Standard

SCALA

LUC | DIS.

CONT. | APP.

TM 626

IMP

TM. 632/A

IF SIGNAL GENERATOR
TYPE FIFG-054

IF SIGNAL GENERATOR

Type ITFG-654

FABBRICA APPARECCHIATURE PER COMUNICAZIONI ELETTRICHE-STANDARD S.p.A.
MILANO - V.le Bodio 33 - Tel. 3772 - Telex 31040 - Cables FACESTANDARD - MILANO
ROMA - Via Abruzzi 25 - Tel. 463421 - Telex 61040 - Cables FACESTANDARD - ROMA
BOLOGNA - NAPOLI - PADOVA - PALERMO - MADDALONI

IF SIGNAL GENERATOR

Type FIFG-054

I N D E X

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2. TECHNICAL CHARACTERISTICS	5
3. CIRCUIT DESCRIPTION	6
3.1. Gaussian pulse modulation	6
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3.3. Continuous wave operation	7
3.4. Power supply	8
4. SERVICE INSTRUCTIONS	8
4.1. Calibration for pulse modulation	8
4.2. Calibration for continuous wave	9
5. [illegible]	
6. [illegible]	

IF SIGNAL GENERATOR

Type FIFG-054

ILLUSTRATIONS

Fig.1 Front view (photo 3078)

" 2 Upper view (cover removed) (photo 3089)

" 3 Internal view oscillator side (photo 3094)

" 4 Not used

" 5 Block schematic

" 6 Schematic SC.1.450.054

" 7 Power supply SC.4.450.527

" 8 [illegible] transportable cabinet

IF SIGNAL GENERATOR

Type FIFG-054

1. GENERAL

The IF Signal Generator type FIFG-054 has been designed for the DME and Tacan beacon operational check.

The purpose of this generator is to make easier the IF circuit and Ferris discriminator alignment of the receiver.

The output frequency, may be selected by a switch among the following: 62,1 - 62,9 - 63 - 63,1 - 63,9 Mc/s.

The frequency stability is obtained by the crystal controlled oscillator which has 5 crystals. A special circuit permits from an external source the square wave pulse modulation, or the modulation with positive gaussian pulses.

The square wave modulation is effected with 2500 c/s signals.

The modulation with positive gaussian pulses has variable code between 10 μs and 38 μs, and maximum frequency 20 Kc/s.

The switch permits to select the following conditions:

1) switch-off the RF output signal to make easier the test meter check
2) square wave pulse modulation
3) gaussian pulse modulation
4) RF output without modulation

A detector circuit using an external C.R. oscilloscope permits to check the modulation waveform and the modulation peak amplitude.

For the RF output level adjustment are employed two variable attenuators, one continuously variable and one in 4 steps of 20 dB.

The d.c. supply is stabilized 1% for a mains voltage change of ±15%. The generator is fully transistorized. The transmitters are of silicon type. The construction is realized in 3 subunit in a metallic box, suitable for rack mounting.

2. TECNICAL CHARACTERISTICS

Output fraquencies	62.1-62.9-63-63.1-63.9 Mc/s
RF modulated power	1 mW
RF peak power with pulse modulation	1 mW
Square wave pulse input level	7 V (min.)
Square wave modulation frequency	2500 c/s max
Gaussian pulse modulation frequency	10 Mc/s max
Detector output	4 V peak
RF output variable attenuator	0÷100 dB
Output impedance	50 ohm
Power supply	110-220-240 V 50/60 c/s

Dimensions and weight (rack mounting)

Height	178 mm
Width	483 mm
Depth	300 mm
Weight	5 Kg approx

Miscellaneous

Transistors	3 2N706 SGS
	1 2N708 "
	1 2N918 "

Diodes	1 SG360	SGS
	1 AAZ13	Philips
Zener	1 OAZ 207	"
Lamps	1 YL10	Glim Comarel
Fuses	1 500 mA Ø 5x20	Weber
	1 200 mA Ø 5x20	"
Crystals	CR 23/U	API
	31,05-31,45-31,5-31,55-31,95 Mc/s	

3. CIRCUIT DESCRIPTION

3.1. Gaussian pulse modulation

The V1 transistor oscillator is crystal controlled between base and emitter, with collector grounded.

V1 collector is fed +10 V stabilized by a Zener diode RdZ1 and is grounded for RF signals.

A 5 position switch SW1 connected to V1 base permits the working crystal selection (X1 to X5) for the frequencies 31,5-31,45-31,5-31,55-31,95 Mc/s corresponding to the output frequencies 62,1-62,9-63-63,1-63,9 Mc/s.

The RF output signal from V1 emitter via C4 is applied to V3 base. V3 operates as frequency doubler. V3 emitter is connected to V2 collector operating as electronic switch.

V2 emitter is ground connected and the base is controlled by the modulation pulses. In absence of modulation pulses V2 is cut-off then the emission of V3 doubler is locked.

The RF signal from V3 collector, with tuned coil at 63 Mc/s is applied via C12 to another 63 Mc/s tuned coil (L4) and then to V4 amplifier base.

The amplified RF signal, from V4 collector via a 63 Mc/s tuned transformer (L5) is applied to the input of a diode balanced modulator (Rd2 to Rd5).

The modulated signal is applied via C22 to V5 (amplifier) base. The RF voltage, modulated and amplified by V5, from collector, via an RF output transformer (L11) is applied to an attenuator (AT1) continuously variable and by a second attenuator in steps of 20 dB (AT2) is applied to SK3 (RF output). A diode Rd16 connected to the continuous attenuator input, detects the modulated signal and via an LC filter and a resistive divider (RV1-R25) applies it to the modulation socket.

3.2. Square wave modulation

In the square wave operation the double V3 emitter and the collector of V2 (electronic switch) are connected to ground via resistance R9 switched-on by SW2-1. In these conditions the RF signal is always present on the V3 doubler collector. The remaining circuits operation is identical to that of pulse operation.

3.3. Continuous wave operation

In the continuous wave operation the V3 (doubler)emitter and the V2 (electronic switch) collector are grounded via R9 switched on by SW2-1. In these conditions the RF signal is always present on the V3 (doubler) collector and on V4 (amplifier) collector.

The RF signal from V4 collector is applied continuously to V5 base via the diode modulator (Rd2 to Rd5) kept unbalanced by a d.c. voltage switched on by SW2-2.

The operation of remaining circuits is identical to that described in the pulse operation.

3.4. Power supply (fig.7)

The mains voltage via PL1, I1 and fuse F1 (110 V) (or F2 220V) is applied to the transformer T3 and then to voltage supply unit +12 V SC.4.450.527 (fig.7). The a.c. input voltage 17.5V is rectified by [illegible] to [illegible] then parallel stabilized by Zener Rdz1 and series stabilized by V8.

The output voltage changes are controlled by V2-V3 which have common emitter. V3 is stabilized by Rdz3.

The V3 collector voltage is used as refered far V4 amplifier. V7 operates as amplifier part for input and part for output stabilization. V7 controls the V8 operation. Adjusting RV1 she V1 base voltage changes, then changes she emitter current, V4 emitter voltage is adjusted for the +12 V stabilization.

The stabilized supply output is distributed to transistors via smoothing filters L10-C24, L9-C21, L8-C10-C5.

4. SERVICE INSTRUCTIONS

Attention - Check that the equipment is preset for the wanted mains voltage

4.1. Calibration for pulse modulation

1) Set the "Modulation" control in "square wave" position
2) Set the frequency control on "63 Mc/s"
3) Connect to "RF output" socket a milliwattmeter with 50 ohm bolometer head.
4) Set the attenuators control to "calibration"
5) Connect to the "Detected output" socket a suitable C.R. oscilloscope

6) Apply to "square wave input" socket a 2500 c/s square wave signal and adjust the level for 0,5 mW on the milliwattmeter.

Attention - The peak output power is double in respect to that shown by the wattmeter

7) Check the peak voltage at "Detected output" (about 0,4 V)

8) Set the "modulation" control in "Pulse" position

9) Apply to "Pulse input" socket a positive gaussian pulse signal and adjust the level to get on the "Detected output" the same peak voltage as point 7). In these conditions the output power is 1 mW

4.2. Calibration for continuous wave

Rotate the switch "Modulation" on position "continuous". For test meter zeroing rotate the switch "Modulation" on "RF off"

5. COMPONENT LIST

SUPPLIER ADDRESSES

A.B.	Allen Bradley Galt Ontario,Canadà	Special Ind. Via Manin,33 Milano	Resistors
AROS	Via Bellinzaghi,17 Milano		Transformers Inductors
ADVANCE	Advance Component Ltd. Roebuck Road - Hainault Essex (England)		Attenuators
API	Via Filelfo,10 Milano		Crystals
CANNON	Cannon Electric.Inc. Humpoldt St. Los Angeles 31 Cal. (U.S.A.)	Cannon Ital. Via Roncaglia,13 Milano	Connectors
COMAREL	Via Montepulciano,17 Milano		Lamps
EL-MENCO (see note)	The Electromotive MFG.Co. Willimantic Conn. (U.S.A.)	MARANO A.V. Via Quadronno,4 Milano	Capacitors
ERIE	Erie Ital. Via M.Gioia,82 Milano		Capacitors
FACE	Face Standard Via Bodio,33 Milano		Miscellaneous
FEME	Viale Certosa,1 Milano		Switches
GIE	Via Turati,28 Milano		Capacitors

LCC STEAFIX	128 Rue de Paris Montreuil s. Bois (Seine) (France)	Microfarad Via M.Gioia,72 Milano	Capacitors
LARIR	Via Premuda,28 Milano		Switches
METAL-LUX	Viale Sarca,94 Milano		
MICROFARAD	Via M.Gioia,72 Milano		Capacitors
PLESSEY	Ilford Essex (England)	Via F.Turati,3 Milano	Potentiometers
SIEMENS	Hoffmann Str.51 München (Germ.)	Via F.Filzi,29 Milano	Coils
STETTNER			Capacitors, ceramic
SPECIAL IND.	Via Manin,33 Milano		Resistors
SGS	Via Restelli,3 Milano		Semiconductors
WEBER	Emmenbrucke (Swiss)	MOLINARI Via Ampere,106 Milano	Fuses

Note: - EL-MINCO capacitors are replaced by FACE or PRECIS
(8 Boul.de Menilmontant - Paris (FR.)

Issue 7/67

IF GENERATOR (A) 1.450.054

Diagr. Ref.	Denomination	Supplier	FACE Code
AT.1	Attenuator 20dB type A55 (71,5x74,5x51,5 mm.)	ADVANCE	9006224
AT.2	Attenuator 80 dB max type A38 (63,5x80x56,5 mm.)	ADVANCE	9006225
C.1	Capacitor, ceramic 0,1 µF 30WV Type GSY 715 (15x15x3 mm.)	MICROFARAD	9085327
C.2	Capacitor, mica 30 pF ± 1% 500WV type DM15-4-CR (11,4x9,14x4,32 mm.)	EL-MENCO	9006234
C.3	Capacitor, ceramic 10000 pF ± 10% 30V d.c. type GSX710 (10x10x3 mm.)	LCC STEAFIX	9006236
C.4	Capacitor, mica 27 pF ± 1% 500 WV type DM10-4-CR (9,4x8,38x4,32 mm.)	EL-MENCO	9006056
C.5	Capacitor, electrolitic, tantalium 68 µF ± 10% 15V d.c. type MCS 14D-686K (Ø 5,2x13,1 mm.)	GIE	9006235
C.6	Capacitor, mica 510 pF ± 5% 300 WV type DM 15-4CR (11,4x9,14x4,32 mm.)	EL-MENCO	9005860
C.7	As C6		
C.8	Capacitor, feed-through 1000 pF Type 2443 "ERIE" (CH 10x14 mm.)	BAY	9085159
C.9	As C.3		
C.10	As C.3		
C.11	As C.4		

Dj gr. Ref.	Denomination	Supplier	FACE Code
C.12	Capacitor, ceramic 2,2 pF ± 0,2 pF 500V d.c. Serie PA - Temp. coeff. NPO (Ø 3x5 mm.)	STETTNER	9006251
C.13	Capacitor, mica 25 pF ± 1% 500 WV Type DM.10-4-CR (9,4x8,38x4,32 mm.)	EL-MENCO	9005487
C.14	As C.3		
C.15	Capacitor, tantalium 1,2 uF ± 10% 15 WV type MCS-14D-125K (Ø 3,9x8,2 mm.)	CIE	9006252
C.16	Capacitor, mica 500 pF ± 1% 500 WV Type DM-15-4CR (11,4x9,14x4,32 mm.)	EL-MENCO	9005434
C.17	Capacitor, mica 26 pF ± 1% 300 WV Type DM.15-4CR (11,4x9,14x4,32 mm.)	EL-MENCO	9006233
C.18	As C.3		
C.19	As C.8		
C.21	As C.3		
C.22	Capacitor, ceramic 1000 pF +50% -20% 500WV type GIX 608 (Ø 8x5 mm.)	LCC	9006250
C.23	As C.3		
C.24	As C.3		
C.25	As C.8		
C.26	Capacitor, mica 22 pF ± 1% 500 WV. Type DM.15-4CR (11,4x9,14x4,32 mm.)	EL-MENCO	9006240

./.

Diagr. Ref.	Denomination	Supplier	FACE Code
C.27	As C.26		
F.1	Fuse 500 mA (Ø 5x20 mm.)	WEBER	9085455
F.2	Fuse 250 mA (Ø 5x20 mm.)	WEBER	9085453
I.1	Switch, two poles type B-10-IS (19x34x29,5 mm.)	FEME	9080037
L.1	Coil 10 µH Type B.82501-A-C15 (Ø 6x21 mm.)	SIEMENS	9006254
L.2	As L.1		
L.3	Coil 0,26 µH ± 10% without core Q = 60 Coil 0,37 µH 10% with core Q = 70 yellow (13x13x19 mm.)	FACE	5451210
L.4	Coil 0,26 µH ± 10% without core Q = 60 Coil 0,37 µH ± 10% with core Q = 70 yellow (13x13x19 mm.)	FACE	5451208
L.5	Coil 0,26 µH ± 10% without core Q = 60 Coil 0,37 µH ± 10% with core Q = 70 yellow (13x13x19 mm.)	FACE	5451209

./.

Diagr. Ref.	Denomination	Supplier	FACE Code
L.6	Coil, H.F. 0,5 mH ± 10% Q = 120 Freq. 790 Kc/s - Res.11 ohms (Ø 8x17mm.)	FACE	5450512
L.7	As L1		
L.8	As L1		
L.9	As L1		
L.10	As L1		
L.11	Coil 1,36 µH ± 10% Q = 115 (7,9 Mc/s) ± 10% (Ø 4x10 mm.)	FACE	5451202
L.12	Coil 50 µH Q = 60 atten. 63 Mc/s (Ø 4,5x18 mm.)	FACE	7434717
LP.1	Lamp. 110÷140V type KL 10 "GLIMM" (Ø 9x28 mm.)	COMAREL	9082377
PL.1	Plug (36,5x38 mm.)	SIEMENS	9865293
PL.2	Connector type BNC.PL.18-M-55 (UG.88/U) (Ø 14,3x27 mm.)	CANNON	9082767
PL.3	As PL2		
PL.4	As PL2		
PL.5	As PL2	CANNON	9082767
PL.6	As PL2		

./.

Diagr. Ref.	Denomination	Supplier	FACE Code
R.1	Resistor, layer 33 Kohm ± 5% 1/4W type RC.07 (ø 2,3x6,5 mm.)	A.B.	9004465
R.2	Resistor, layer 22 Kohm ± 5% 1/4W type RC.07 (ø 2,3x6,5 mm.)	A.B.	9004461
R.3	Resistor, layer 20 ohm ± 5% 1/4W type RC.07 (ø 2,3x6,5 mm.)	A.B.	9004421
R.4	Resistor, layer 160 ohm ± 5% 1/4W type RC.07 (ø 2,3x6,5 mm.)	A.B.	9004410
R.5	Resistor, layer 10 Kohm ± 5% 1/4W type RC.07 (ø 2,3x6,5 mm.)	A.B.	9004453
R.6	Resistor, layer 47 Kohm ± 5% 1/4W type RC.07 (ø 2,3x6,5 mm.)	A.B.	9004469
R.7	Resistor, layer 3,3 Kohm ± 5% 1/4W type RC.07 (ø 2,3x6,5 mm.)	A.B.	9004441
R.8	Resistor, layer 1 Kohm ± 5% 1/4W type RC.07 (ø 2,3x6,5 mm.)	A.B.	9004429
R.9	Resistor, layer 47 ohm ± 5% 1/4W type RC.07 (ø 2,3x6,5 mm.)	A.B.	9004397
R.10	Resistor, layer 330 ohm ± 5% 1/4W type RC.07 (ø 2,3x6,5 mm.)	A.B.	9004417
R.12	As R5		
R.13	As R6		
R.14	Resistor, layer 220ohm ± 5% 1/4W type RC.07 (ø 2,3x6,5 mm.)	A.B.	9004413

Diagr. Ref.	Denomination	Supplier	FAC. Code
R.15	Resistor, layer 100 ohm ± 5% 1/4W type RC.07 (Ø 2,3x6,5 mm.)	A.B.	9004405
R.16	Resistor, layer 56 ohm ± 5% 1/4W type RC.07 (Ø 2,3x6,5 mm.)	A.B.	9004399
R.17	As R9		
R.18	Resistor, layer 2,7 Kohm ± 5% 1/4W type RC07 (Ø 2,3x6,5 mm.)	A.B.	9004439
R.19	As R10		
R.20	As R5		
R.21	As R2		
R.22	Resistor, layer 215 ohm ± 1% 1/4W AT serie (Ø 5x10 mm.)	METAL-LUX	9947233
R.23	As R15		
R.24	As R9		
R.25	Resistor, layer 2,2 Kohm ± 5% 1/4W type RC.07 (Ø 2,3x6,5 mm.)	A.B.	9004437
R.26	Resistor, layer 1 Kohm ± 5% 1W Type RC.20 (Ø 2,3x6,5 mm.)	A.B.	9004698
Rd.2	Diode, silicium type SGS 60 (Ø 2,8x6,5 mm.)	SGS	9004209
Rd.3	As Rd.2		
Rd.4	As Rd.2		
Rd.5	As Rd.2		

Diagr. Ref.	Denomination	Supplier	FACE Code
Rd.6	Diode Type AAZ.13 (Ø2,5x7,6 mm. max)	PHILIPS	9005117
Rd.7	As Rd.2		
Rdz.1	Diode, Zener type OAZ-207 (Ø 6x15 mm.)	PHILIPS	9006226
RV.1	Potentiometer, miniature 2,5 Kohm ± 20% 0,25W at 85°C tipe "L" (Ø 12,7x24,6 mm.)	PLESSEY	9006197
SK.1	Socket, type BNC-JB-F-55 (UG.909/4) (CH.17,5x29,5 mm.)	CANNON	9005874
SK.2	As SK.1		
SK.3	As SK.1		
SK.4	Socket type BNC-RB5-F-0 (UG 657/U) (CH.14,2x32,1 mm.)	CANNON	9085157
SK.5	As SK.4		
SK.6	As SK.4		
SW.1	Switch, 1 wafer ceramic, 1 way, 5 positions - serie PA.6000M deviation angle 30°, movible contact, not shortcircuiting (32,5x32,5x23 mm.)	LARIR	9006255
SW.2	Switch, 1 wafer ceramic, 2 ways, 4 positions serie PA.6000M, deviation angle 30°, movible contact, not shortcircuiting (32,5x32,5x23 mm.)	LARIR	9006517

./.

Diagr. Ref.	Denomination	Supplier	FACE Code
T.1	Transformer FXC 9500-721 inductance : 1-2 = 29 µH ± 25% 1 Kc/s with 1mV " : 3-4 = 29 µH ± 25% 1 Kc/s with 1mV " : 5-6 = 29 µH ± 25% 1 Kc/s with 1mV " : 3 (4-5)6 = 130 µH ± 25% 1Kc/s with 4mV (18x11 mm.)	FACE	3591741
T.2	As T1		
T.3	Transformer, power primary : 0-110-220-240V 45÷60 c/s secondary : 0-17,5V 1A. screen copper between primary and secondary Output power 18W (72x73x82 mm.)	AROS	9082993
V.1	Transistor type 2N706 (Ø 5,5x5 mm.)	SGS	9082772
V.2	Transistor type 2N708 (Ø 5,5x5 mm.)	SGS	9082773
V.3	As V1		
V.4	As V1		
V.5	Transistor type 2N918 (Ø 5,3x5,3 mm.)	SGS	9082824
X.1	Crystal 31,05 Mc/s type CR-23-U (18x8x19 mm.)	API	9081259
X.2	Crystal 31,45 Mc/s type CR-23-U (18x8x19 mm.)	API	9081311
X.3	Crystal 31,5 Mc/s type CR-23-U (18x8x19mm.)	API	9081257

./.

Diagr. Ref.	Denomination	Supplier	FACE Code
X.4	Crystal 31,55 Mc/s type CR-23-U (18x8x19 mm.)	API	9006260
X.5	Crystal 31,95 Mc/s type CR-23-U (18x8x19 mm.)	API	9006258
XF.1-2	Fuseholder 6A max. type 9102-A (19x32 mm.)	FACE	3502436
XLP.1	Lampholder Type 210 red (Ø 20x43 mm.)	COMARMEL	9080407

./.

+12 V STABILIZED SUPPLY BT. (DN) 4.450.527

Diagr. Ref.	Denomination	Supplier	FACE Code
C.1	Capacitor, electrolit. 1000 µF 35÷40 WL. Type B 41010 A 7108-S (Ø 20x56 mm.)	SIEMENS	9005383
C.2	As C.1		
R.1	Resistor, layer 3,83 Kohm ±1% 1/2W (Ø 4,1x10,5 mm.)	SECI	9978357
R.2	Resistor, layer 3,92 Kohm ± 1% 1/2W (Ø 4,1x10,5 mm.)	SECI	9978358
R.3	Resistor, layer 1,3 Kohm ±1% 1/2W (Ø 4,1x10,5 mm.)	SECI	9978312
R.4	As R.1		
R.5	Resistor, layer 619 ohm ± 1% 1/2W (Ø 4,1x10,5 mm.)	SECI	9978277
R.6	Resistor, layer 221 ohm ± 1% 1/2W (Ø 4,1x10,5 mm.)	SECI	9978234
R.7	Resistor, layer 2,87 Kohm ± 1% 1/2W (Ø 4,1x10,5 mm.)	SECI	9978345
R.8	Resistor, layer 2,32 Kohm ±1% 1/2W (Ø 4,1x10,5 mm.)	SECI	9978336
R.9	Resistor, layer 6,81 Kohm ±1% 1/2W (Ø 4,1x10,5 mm.)	SECI	9978381
R.10	Resistor, layer 1,74 Kohm ±1% 1/2W (Ø 4,1x10,5 mm.)	SECI	9978324
R.11	Resistor, layer 3.32 Kohm ±1% 1/2W (Ø 4,1x10,5 mm.)	SECI	9978351
R.12	As R.11		

Diagr.	Denomination	Supplier	FACE Code
R.13	Resistor, layer 10 Kohm ± 1% 1/2W (Ø 4,1x10,5 mm.)	SECI	9978401
R.14	Resistor, layer 1.15 Kohm ± 1% 1/2W (Ø 4,1x10,5 mm.)	SECI	9978307
R.15	Resistor, layer 1 Kohm ± 1% 1/2W (Ø 4,1x10,5 mm.)	SECI	9978301
R.16	Resistor, layer 2 ohm ± 1% 1/2W (Ø 4,1x10,5 mm.)	SECI	9978030
Rd.1	Rectifier, silicium type SGS 60	SGS	9004209
Rd.2	Rectifier, silicium type BYZ 13	PHILIPS	9082743
Rd.3	As Rd.2		
Rd.4	As Rd.2		
Rd.5	As Rd.2		
Rdz.1	Diode, Zener type ZF 5,6	INTERMETAL	9005352
Rdz.2	Diode, Zener type ZF 6,2	INTERMETAL	9005353
Rdz.3	As Rdz.1		
RV.1	Resistor, variable 200 ohm ± 10% type 3067 P.1-201 (Ø 9.1x27 mm.)	BOURNS	9005354
V.1	Transistor, N.P.N. type 2N 708	SGS	9082773
V.3	As V.1		
V.4	As V.1		
V.5	As V.1		
V.6	Transistor P.N.P. type 2N 1131	S.G.S	9005379

Diagr. Ref.	Denomination	Supplier	FACE Code
V.7	Transistor, N.P.N. type 2N 1613	TEXAS INST.	9085936
V.8	Transistor, N.P.N. type BDY 10	PHILIPS	9005378

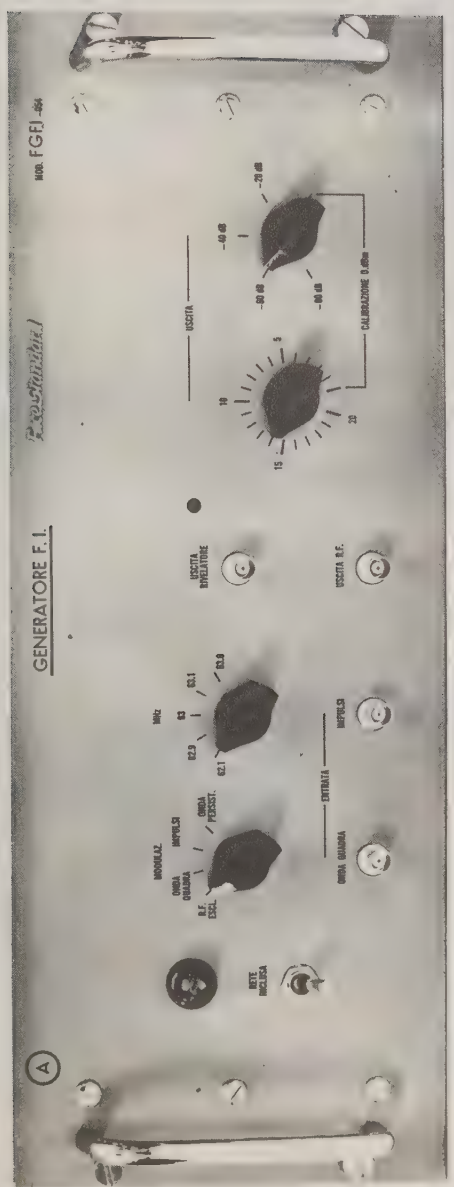


FIG.1

IF GENERATOR - FRONT VIEW

GENERATORE FI - VISTA FRONTALE

/A

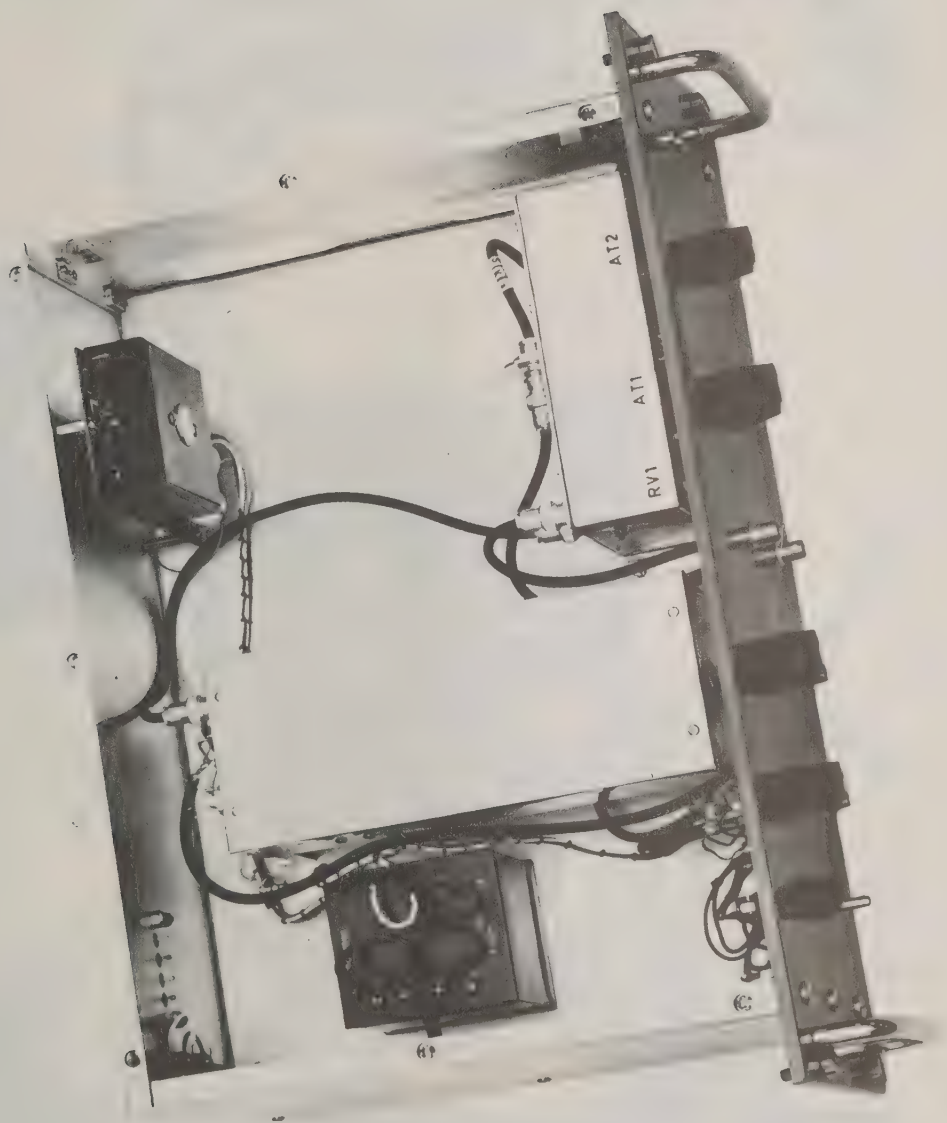


FIG.2

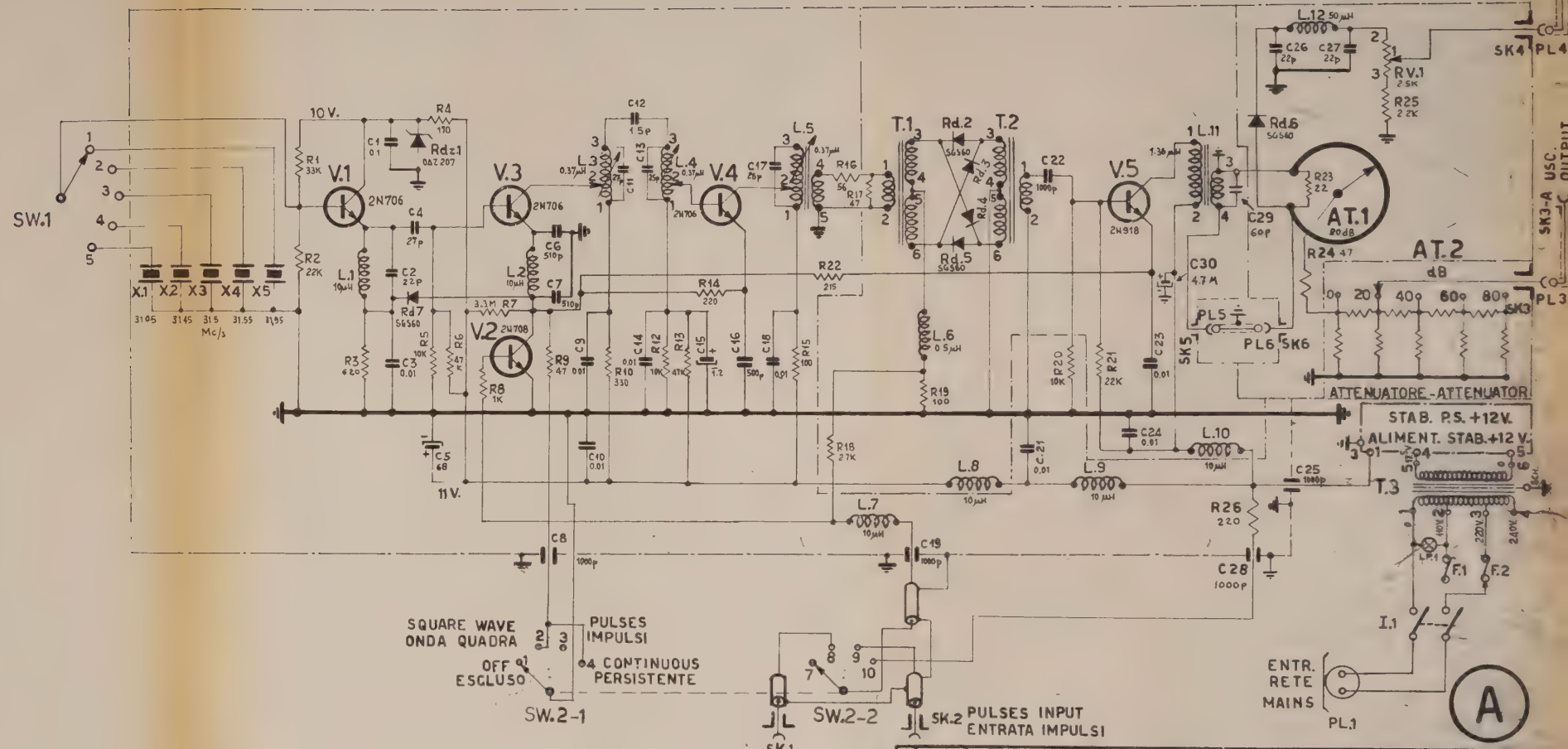
IF GENERATOR - UPPER VIEW

GENERATORE FI - VISTA SUPERIORE

FIG. 5

GENERATORE F.I. MOD. FIFG-054
SCHEMA A BLOCCHI
I.F. GENERATOR
BLOCK SCHEMATIC

SC.1450054



Ed.	DATA	RIFERIMENTI
1A	12-4-66	
2A	20-7-66	
3A	28-9-66	
4A	14-12-66	
5A	4-7-67	
6A	27-7-67	
7A	28-5-68	
8A	20-10-67	

STRUM. D.M.E.

TM. 632/A | FIG. 6

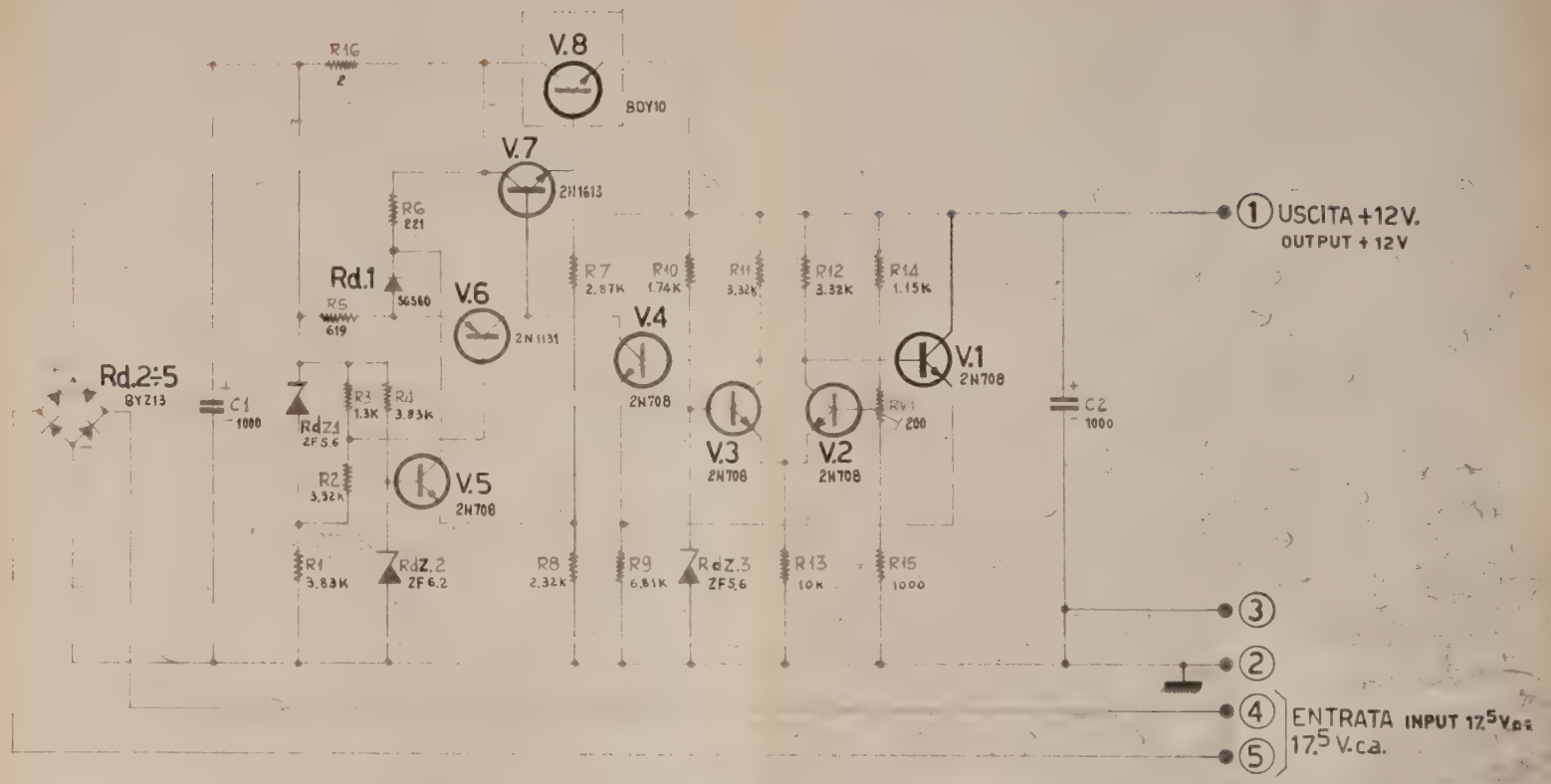
I. F. GENERATOR
GENERATORE F. I.

Face Standard

SCALA
LUC. | DIS.
CONT. | APP.

SC.1450054

SC.4450527 TAV. 1-4



DN

TM. 626/A - FIG. 24

id	DATA	RIFERIMENTO
1ª	6-5-66	
2ª	4-7-67	
3ª	26-7-67	

STRUM. DME

TM. 632/A | FIG. 7

+ 12V STAB. SUPPLY. UNIT

ALIMENTATORE B.T.
+12V. STABILIZZATO

Face Standard

SCALA
LUC. | DIS.
CONT. | APP.

SC.4450527 TAV. 1-4

TM 632

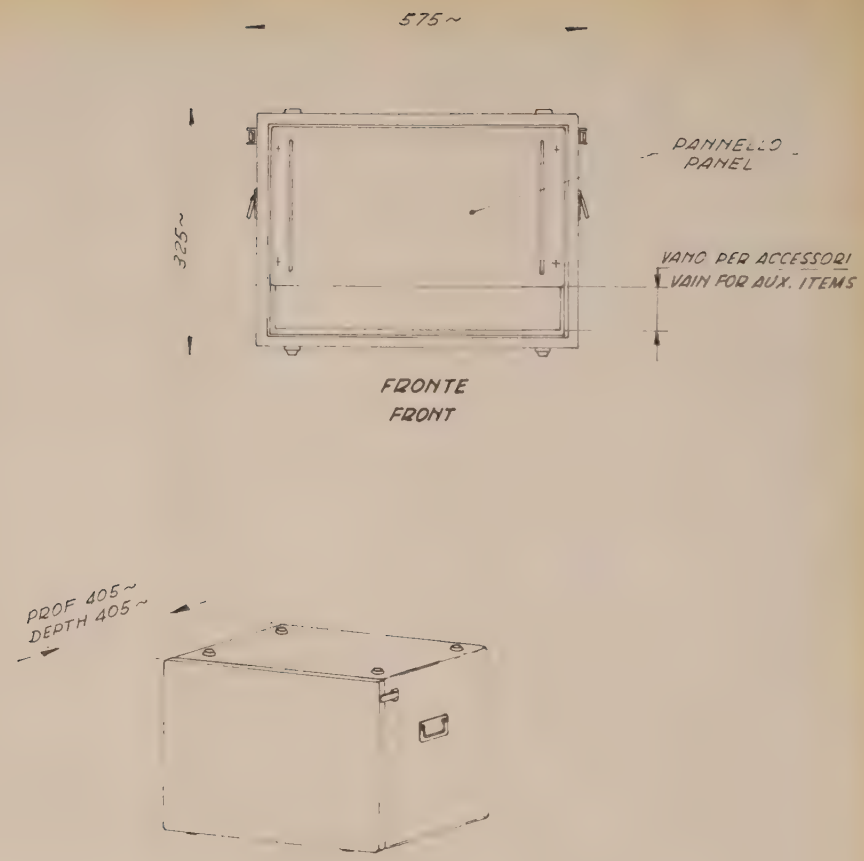


FIG. 8

Ed	DATA	RIFERIMENTI
1°	11-5-67	

IMP.

GENERATORE F.I. MOD. FIFG-054 IN COFANO METALL. TRASPORTAB.

—O—

I.F. GENERATOR MOD. FIFG-054 IN TRANSPORTABLE METAL CABINET

Face Standard

SCALA

LUC | D.S.

CONT. | APP.

TM 632

Mod. 10 - C. T. 751 - 9874010

TM. 633 A

RF SIGNAL GENERATOR
TYPE FGSR-055

RF SIGNAL GENERATOR

Type FGSR-055

Face Standard

FABBRICA APPARECCHIATURE PER COMUNICAZIONI ELETTRICHE-STANDARD S.p.A.
MILANO - V.le Bodio 33 - Tel. 3772 - Telex 31040 - Cables FACESTANDARD - MILANO
ROMA - Via Abruzzi 25 - Tel. 463421 - Telex 61040 - Cables FACESTANDARD - ROMA
BOLOGNA - NAPOLI - PADOVA - PALERMO - MADDALONI

RF SIGNAL GENERATOR

Type FGSR-055

I N D E X

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RF SIGNAL GENERATOR

TYPE FGSR-055

ILLUSTRATIONS

Fig.1 Front view

" 2 " " (photo 3080)

" 3 Upper view (cover removed) (photo 3092)

" 4 Equipment in a transportable metal cabinet

" 5 Block schematic

" 6 Schematic (SC.1.450.055)

RF SIGNAL GENERATOR

Type FGSR-055

PART I - GENERAL

The RF signal generator type FGSR-055 has been designed for the DME and Tacan beacon control. The purpose of FGSR-055 signal generator is to make easy the RF and video circuits alignments of the receiving section and the DME and Tacan channel check.

The FGRS-055 oscillator is realized with a special cavity and the frequency change is obtained by the digital counter with reference to the calibration tables.

The frequency range is 960 to 1220 Mc/s.

A variable attenuator permits an output level change of 50 dB. An audio frequency amplifier using an external source modulates directly the oscillator both with square waves and with gaussian pulses.

The modulation may be with 2500 square pulses per second, or with positive gaussian pulses with variable code pair between 10 and 38 /usec. with 20 Kc/s pulse repetition frequency.

The FGSR-055 generator has two separated modulation inputs, for square pulses and for gaussian pulses.

A 4 position switch permits to select the following conditions:

1) RF signal switch-off at RF output to make easy the check of the test meter
2) Square pulse modulation input
3) Gaussian pulse modulation input
4) RF continuous (with modulation) output.

A detector circuit permits by an external C.R.O. to check the modulation waveform and the modulation peak amplitude.

The d.c. power supplies included the oscillator filament are voltage stabilized at ±1% for mains change ±15%.

All parts are contained in a rugged metallic box suitable for a standard rack. At request may be delivered with an additional metallic box with slides for generator inspection, suitable for laboratory or field use.

PART II - TECNICAL CHARACTERISTICS

Frequency range	960-1220 Mc/s
Continuous modulated RF power	10 mW (max)
RF peak power with pulse modulation	7 mV peak (max)
Square wave pulse input level	6 V peak
Frequency for modulation with square wave	2500 c/s max
Frequency for modulation with gaussian pulses	10 Kc/s max
Detector output	0,5 peak min.
RF output variable attenuator	0 to 50 dB
Output impedance	50 ohm
Power supply	110-220-240 V 50-60 c/s

Miscellaneous

Valves

V1	CV4024	(12AT7)	Mullard	- amplifier
V2	CV4063	(6AM5)	Mullard	- modulator
V3	CV273FL	(EC55)	Philips	- oscillator

Zener

2	1N2843-B	Motorola
1	10M 62 A210	"
3	10M 51Z5	"

Diodes

1	1N 416B	Microwave or 1N21BR
16	BYY 10	Philips
2	BYZ13	"
1	OA214	"

Fuses

2	0,1 A	Ø 5x20
1	0,2 A	"
1	0,3 A	"
1	1 A	"
1	2 A	"

Lamps

1	KL10	Glimm	Philips

Dimensions and weight (rack mounting)

Height	mm 267
Width	mm 483
Depth	mm 340
Weight	Kg.8 approx

PART III - OPERATING PRINCIPLE (Block schematic fig.7)

3.1. Oscillator

The oscillator is composed by a triode EC55 (V3) and a double coaxial cavity. The valve oscillates between cathode and grid, the anode is ground connected via an RF link capacitor, built-in at the cavity end.

The triode grid is connected directly to the cavity end. The lenght change of this cavity is obtained by a movable shortcircuit at 3/4 of wavelenght at the working frequency.

The cathode is ground insulated and coupled to the internal cavity via a capacitor built in the cavity. The cavity lenght is adjusted at 1/4 wavelenght by a second movable shortcircuit.

The shortcircuit controls are obtained by a knob on a shaft with two threads. A screw applied in the external cavity permits to adjust the feedback between the two cavities to obtain the best valve working condition.

The anode and filament-cathode supplies are connected to the valve V3 via three LC filters, through the screening box containing the cavities.

3.2. RF attenuator

The RF output is adjusted by a plunger attenuator mounted in the cavity consisting of a turn introduced in the grid cavity through a pipe with open ends.

The control is by a rack with compensated pinion. The adjustment is obtained by a dial handle directly calibrated in dB

3.3. Modulated RF signal detector

The detector includes one diode type 1N 416B (RD) with load resistance and a pin probe closed in a metallic housing.

The coupling is adjustable.

The output positive voltage is used by a O.R. oscilloscope to check the peak figure and the modulation waveform.

3.4. Modulator

The modulator is composed by V1 (dual triode) type CV4024 (12AT7) and by a pentode V2 type CV4063 (6AM5).

The modulation positive pulses applied to V1A grid operating as cathode follower are sent directly to V1B cathode (CV4024), operating as a low distortion amplifier.

By a capacitor the amplified signal is sent to the modulator pentode V2 grid (CV 4063), operating as a cathode follower.

The output signal from V2 cathode, via a switch is applied to the oscillator V2 anode (EC55).

The modulator V2 grid with limiter diode, is biassed negatively to obtain the complete voltage cut-off to the V1 oscillator in the time between one modulation pulse and another.

A switch permits the selection of 4 operating conditions "RF off - Square wave modulation - Pulse modulation - Continuous wave"

In the condition "RF off" the oscillator V3 anode is insulated and no signal is present at the RF output.

In the condition "Square wave modulation" switches-on the modulator on the oscillator V3 anode and the V1A grid is switched on "Square wave input"socket.

In the condition "Pulse modulation" the modulator is switched-on the V3 oscillator anode and the V1A grid are switched on "Pulse input" socket.

In the condition "Continuous wave" the modulator and modulation inputs are switched-off, the V3 oscillator anode via a resistor is fed directly by +300 V stabilized.

In this condition the RF output is only carrier

3.5. Power supplies

The d.c. supplies are +300 V -150 V and 6,3 V realized with silicon diodes and the output voltages are stabilized by Zeners Rd21 to Rd26.

The voltage stabilization is within ±1% for a mains voltage change ±15%

PART IV - CIRCUIT DESCRIPTION (Schematic fig.8)

4.1. Operation with square wave signal

The square wave signal at SK2 input via C16-RV4-Sw1a on position 9 and R8 is applied to grid 2 of triode V1A.

The V1A anode is fed directly by +300 V and is ground connected for A.F. signals. The signal not amplified from the cathode 3 of V1A, biassed by R19 is applied to the V1B cathode 8.

The grid 7 of V1B is biassed via R11-12. The amplified signal from V1B anode fed by +300V via R10 is applied via C13 to the grid 1 of V2 connected to the limiter diode Rd4 and biassed negatively via R14-R17-RV5-R18. The anode 5 and screen 7 of V2 are fed by +300 V via R13 and ground connected for the A.F., by C14.

The signal not amplified from V2 cathode output biassed by R15 is applied via SW1b on position 10 and the filter C18-L4-C19-L3 to the V3 anode. The voltage pulses received by V3 anode are transformed via grid and cathode and relative cavities in RF pulses. A small portion of RF signal is picked up from the grid cavity inside and via R22 is applied to diode Rd5.

The signal detected by Rd5 is sent to the detected output via SK2 loaded by R21-C17.

The variable attenuator with turn L7 and matching resistor R23, controls the signal picked from the grid and applies it to the RF output via SK4.

4.2. Operation with gaussian pulses

The gaussian pulse signal in SK1 is applied to SW1a in position 3 and to the grid 2 of V1B. The operation is now identical to that described in 4.1.

4.3. Operation with continuous wave

+300 V via R16-SW1b in position 8, C18-L4-C19-L3 feeds the V3 anode.

The detector circuit and attenuator operation is identical to that described in 4.1.

V1 and V2 circuits are switched-off.

4.4. Power supplies

The mains voltage applied to PL1 via I1, F2 for 220 V or F1 for 110 V feeds the T1 transformer with the 110 V tap connected to lamp LP1.

The supplies +300 V, -150 V, 6,3 V d.c. for V3, 6,3 V a.c. for V2, 6,3 V a.c. for V1 have in common the T1 secondaries.

The +300 V stabilized is obtained by secondary 5-6 of T1, which via F3 feeds Rd1 in parallel with C1-C2-R1.

The output voltage from Rd1 is applied to filter L1-C7-C8 and via RV2-R5 is applied to Zeners Rdz1-Rdz2 with C11. The positive voltage via F5 is applied to V1A anode, resistor R10 applies it to V1B, R11 to V1B grid, R13 to V2 anode R16 to V3 anode.

The negative voltage is ground connected.

The -150 V supply is obtained from secondary 7-8 of T1 which via F4 supplies Rd2 having in parallel C3-C4-R2. The output voltage from Rd2 is applied to filter L2-C9-C10 and via R7-RV3 is applied to Zeners Rdz4 to Rdz6 having in parallel C12.

The negative voltage via F6 feeds R9-R17. The positive voltage is ground connected.

The 6,3 V d.c. is obtained by secondary 13-14 of T1 which feeds Rd3.

The output from Rd3 feeds Zener Edz1 and the oscillator V3 filament.
The secondary 11-12 is used for V1 filament
The secondary 13-14 is used for V2 filament

PART V - SERVICE INSTRUCTIONS

Attention - Check that the equipment is preset for the selected mains voltage

5.1. Operation with pulse operation

1) Switch on the mains
2) Set the "modulation" switch on position "square wave"
3) Set the "tuning" control for the needed frequency with reference to calibration chart
4) Apply to SK2 "square wave input" a square wave 6 V peak square at 2500 c/s
5) Connect to SK4 "RF output" a VHF millivoltmeter, 50 ohm impedance
6) Adjust the wanted output power by the "attenuator" till 0,5 mW (1 mW peak).
   Attention - The peak output power is double in respect to that shown by the bolometer
7) Connect to "detected output" a suitable oscilloscope and read the peak voltage
8) Set the "modulation" control in position "Pulses"
9) Apply to SK1 "pulse input" a gaussian pulse signal and adjust the voltage to obtain on the "detected output" the same peak voltage of item 7).
   In these conditions the peak power at "RF output" is equal to that measured in item 6)
10) For the bolometer zeroing (1 mW) set SW1 on position "RF off"

5.2. Operation with continuous wave

Set SW1 "modulation" on position "continuous wave".

In these conditions the RF output power is equal to that shown by the bolometer.

SUPPLIER ADDRESSES

A.B.	Allen Bradley Galt, Ontario (Canadà)	Special Ind. Via Manin,33 Milano	Resistors
AEI	Barton Millworks, Maze St. Bristol	RST Via Fontana,18 Milano	Sockets
AROS	Via Bellinzaghi,17 Milano		Transformers
CANNON	Cannon Electric.Inc. Humpoldt St. Los Angeles,31 Cal. (U.S.A.)	Cannon Ital. Via Roncaglia,13 Milano	Connectors
COMAREL	Via Montepulciano,17 Milano		Lamps
EL-MENCO (see note)	The Electromotive Mfg.Co. Willimantic Connect.(U.S.A.)	MARANO Via Quadronno,4 Milano	Capacitors
FACE	Face Standard Via Bodio,33 Milano		Miscellaneous
GIE	Via Turati,28 Milano		
ICAR	Corso Magenta, 65 Milano		Capacitors
MICROFARAD	Via M.Gioia, 72 Milano		Conductors
METAL-LUX	Viale Sarca,94 Milano		Resistors Varistors

MOTOROLA	Semiconductor Products 5005 East Mc.Dowell Rd. Phoenix, Ariz. (U.S.A.)	Metroelettronica Via Cirene,18 Milano	Diodes
MULLARD	Mullard - Vinkor Ltd. Mullard House Torrington Place London W.C.1(England)		Valves
PLESSEY		Plessey It. Via Turati,3 Milano	Potentiometers
PHILIPS	Philips Eindhoven (Holland)	Philips P.za IV Novembre,3 Milano	Diodes
SECI	Via G.B. Grassi,97 Milano		Resistors
STR	Standard Radio See Strasse,395 - Zurich (Swiss)	Face Standard Via Bodio,33 Milano	Capacitors, electrol.
WEBER	Emmenbrucke - Swiss	Molinari Via Ampere,106 Milano	Fuses

Note : - ML-[illegible] MCO capacitors are replaced by [illegible] or FRANCIS
(8 Boul. de Menilmontant - Paris (F.).

RF SIGNAL GENERATOR (B) 1.450.055

Diagr. Ref.	Denomination	Supplier	FACE Code
C1	Capacitor, met. paper 0,22 µF ± 20% 1500 WV Type MCT-E-220 (Ø 16,5x33,5 mm.)	MICROFARAD	9006287
C2	As C1		
C3	Capacitor, met. paper 0,1 µF ± 20% 1500WV Type MCT-E-100 (Ø 16,5x33,5 mm.)	MICROFARAD	9006286
C4	As C3		
C5	Capacitor, electrolitic 1000 µF 50WV Type STABILITIC-21G-100 (Ø 25x50 mm.)	ICAR	9006510
C6	Capacitor, electrolitic 1000 µF 12WV Type 2.6167-B/1000/12 (Ø26x48 mm.)	STR	9005194
C7	Capacitor, paper oil 8 µF ± 10% 500WV Type PROTEX V.80 (Ø 41x87 mm.)	ICAR	9081119
C8	As C7		
C9	Capacitor, paper oil 10 µF ± 10% 350 WV Type PROTEX B.100 (Ø 45x112)	ICAR	9082232
C10	As C9		
C11	As C3		
C12	As C3		
C13	Capacitor, paper 0,1 µF ± 10% 630 WV Type MCT (Ø 9x32,5 mm.)	MICROFARAD	9080148
C14	Capacitor, met. Mylar 2 µF ± 5% 350WV Series MM (Ø 22x45 mm)	FACE	5674193
C15	Capacitor, electrolitic 100 µF 25WV Type Z-6176-L/100/25 (Ø 10,2x30 mm.)	STR	9005183

Diagr. Ref.	Denomination	Supplier	FACE Code
C16	Capacitor, electrol, tantalium 10 uF ± 10% 10V 60 Vp. Type NPN-CS13C116 (Ø 5,2x24,7 mm.)	CIE	9006544
C18	Capacitor, component of 2.450.174	FACE	
C19	Capacitor, component of 2.450.174		
C20	Capacitor, component of 2.450.174		
C21	Capacitor, component of 2.450.174		
C22	Capacitor, component of 2.450.174		
C23	Capacitor, component of 2.450.174		
F1	Fuse 1A (Ø 5x20 mm.)	WEBER	9085458
F2	" 2A (Ø 5x20 mm.)	WEBER	9085461
F3	" 300mA (Ø 5x20 mm.)	WEBER	9085454
F4	" 100mA (Ø 5x20 mm.)	WEBER	9085451
F5	" 200mA (Ø 5x20 mm.)	WEBER	9085452
F6	As F4		
I1	Switch, two poles Type B10-IS (19x34x29,5 mm.)	FUXE	9080037
L1	Filter, coil 8+8H 0,1A d.c., a.c. 250V, a.c. compoent 100 c/s d.c. resistance 250+250 ± 15% (83x72x70 mm.)	AROS	9083052

Issue 7/67

Diagr. Ref.	Denomination	Supplier	FACE Code
L2	Filter, coil 25+25 H. d.c. 0,05 A, a.c. 200V, a.c. component 100 c/s d.c. resistance 730+730 ± 15% (83x72x70 mm.)	AROS	9083051
L3	Coil, 0,17 µH ± 20% Q=100 (Ø 5x12,5 mm.)	FACE	5451239
LP1	Lamp. micromignon, neon 110÷140V Type KL10 "GLIMM" (Ø 9x28 mm.)	COMAREL	9082377
PL1	Plug, mains type "SIEMENS" (Ø 36,5x38 mm.)	SIEMENS	9865293
R1	Resistor, wire 1Kohm ± 10% 5W (Ø 6x21 mm.)	SECI	9988301
R2	Resistor, wire 3,9 Kohm ± 10% 5W (Ø 6x21 mm.)	SECI	9988315
R3	Resistor, wire 15 ohm ± 10% 10W Type RVS 8.45 (Ø 8x45 mm.)	SECI	9006495
R5	Resistor, wire 2,2 Kohm ± 10% 10W Type RVS.8.45 (Ø 8x45 mm.)	SECI	9006493
R6	Resistor, layer 100 ohm ± 10% 1/2W (Ø 4,1x10,5 mm.)	SECI	9976201
R7	Resistor, wire 3,3 Kohm ± 10% 12W Type RVS 8,45 (Ø 8x45 mm.)	SECI	9007433
R8	Resistor, layer 470 ohm ± 10% 1/2W (Ø 4,1x10,5 mm.)	SECI	9976217
R9	Resistor, wire 15 Kohm ± 5% 10W Type RSM 9,37 (Ø 9,5x39 mm.)	SECI	9993405
R10	Resistor, layer 47 Kohm ± 10% 1W (Ø 6,7x16 mm.)	SECI	9979417

Diagr. Ref.	Denomination	Supplier	FACE Code
R11	Resistor, layer 220 Kohm ± 10% 1W (Ø 6,7x16 mm.)	SECI	9979509
R12	Resistor, layer 2,7 Kohm ± 10% 1/2W (Ø 4,1x10,5 mm.)	SECI	9976311
R13	Resistor, layer 220 ohm ± 10% 1W (Ø 6,7x16 mm.)	SECI	9979209
R14	Resistor, layer 470 Kohm ± 10% 1W (Ø 6,7x16 mm.)	SECI	9979517
R15	Resistor, wire 6,8 Kohm ± 10% 10W Type RSM 9.37 (Ø 9,5x39 mm.)	SECI	9990321
R16	Resistor, wire 10 Kohm ± 5% 10W Type RSM 9.37 (Ø 9,5x39 mm.)	SECI	9993401
R17	Resistor, layer 100 Kohm ± 10% 1W (Ø 6,7x16 mm.)	SECI	9979501
R18	Resistor, layer 4,7 Kohm ± 10% 1/2W (Ø 4,1x10,5 mm.)	SECI	9976317
R21	Resistor, layer 620 ohm ± 5% 1/2W (Ø 4,1x10,5 mm.)	SECI	9977220
R22	Resistor, special 200 ohm (part of detector group 4.450.562)	METAL-LUX	9006656
R23	Resistor, carbon 47 ohm ± 5% 1/4W Type RC 07 (Ø 2,3x6,5 mm.)	A.B.	9004397
R24	Resistor, wire 15 Kohm ± 5% 3W T211 (Ø 6x14 mm.)	SECI	9985405
Rd.1	Rectifier, mounting with : n°4x2x1 rectifier type 1VA120 Cod. 9007346 (Ø 25x60 mm.)	FACE	5451176
Rd.2	As Rd.1		
Rd.3	Rectifier, type BYZ 13	PHILIPS	9082743
Rd.4	Rectifier, type OA 214	PHILIPS	9080165

Diagr. Ref.	Denomination	Supplier	FACE Code
Rd.5	Rectifier, type 1N 21BR / 1N 416B (part of detector unit 4.450.562)	MICROWAVE	9006647 o 9006648
Rdz.1	Diode, Zener Type 10M6,2 AZ10 (19x38x40 mm.)	MOTOROLA	9006303
Rdz.2	Diode, Zener Type 1N 2843-B (22x38x10 mm.)	MOTOROLA	9006305
Rdz.3	As Rdz.2		
Rdz.4	Diode, Zener Type 10M51Z5	MOTOROLA	9006304
Rdz.5	As Rdz.4		
Rdz.6	As Rdz.4		
RV1	Resistor, variable 18 ohm 12W Type RVR 8.45 (Ø 8x45 mm.)	SECI	9006301
RV2	Resistor, variable 2 Kohm 12W Type RVR 8.45 (Ø 8x45 mm.)	SECI	9006302
RV3	As RV2		
RV4	Potentiometer, linear 50 Kohm ± 20% 1/4W -85°C (Ø 12,7x28,9 mm.)	PLESSEY	9006534
RV5	Potentiometer, linear 5 Kohm ± 20% 1/4W -85C (Ø 12,7x28,9 mm.)	PLESSEY	9006535
SK1	Socket, coaxial (UG 657/U) Type BNC-RB4-F-0 (CH.12,7x32 mm.)	CANNON	9005157
SK2	As SK1		
SK3	As SK1		
SK4	Socket, coaxial (UG 909/U) Type BNC-JB-F-55 (CH.17,5x29,5 mm.)	CANNON	9005174
SK5	Socket, coaxial (part of detector unit)	FACE	

Diagr. Ref.	Denomination	Supplier	FACE Code
SW1	Switch, rotary, 2 way, 4 position, 1 ceramic wafer, series PA.6000M Shaft modified to mm.18 (32,5x32,5x29,8 mm.)	FACE	7434834
T1	Transformer 135 VA Primary : 0-110-220-240V 45÷65 c/s Secondary : 1st-0-500V 100mA 2nd-0-370V 50mA 3rd-0-18V 0,8 A 4th-0-6,3V 0,6 A 5th-0-6,3V 0,6 A Mil T.278 - Grade 4° - Class. R Life X (116x134x160,5 mm)	AROS	9083053
V1	Tube, electron, 9 pins Type CV4024 12AT7 (Ø 20x55 mm.)	MULLARD	9080917
V2	Tube, electron, 7 pins Type CV 4063 6516 (Ø 18x55 mm.)	MULLARD	9006309
V3	Tube, Type CV273	PHILIPS	9006310
XF1÷6	Fuse holder 6A max. Type 9102-A (Ø19x32mm.)	FACE	3502436
XLP.1	Lamp. holder, Type 210 red (Ø 20x43 mm.)	COMAREL	9080407
XV.1	Tube holder, 9 pins Type B9A-WS (24x30x35 mm.)	AMI	9001633
XV.2	Tube holder, 7 pins Type B7G-WS (20,4x28x30 mm.)	AMI	9001594

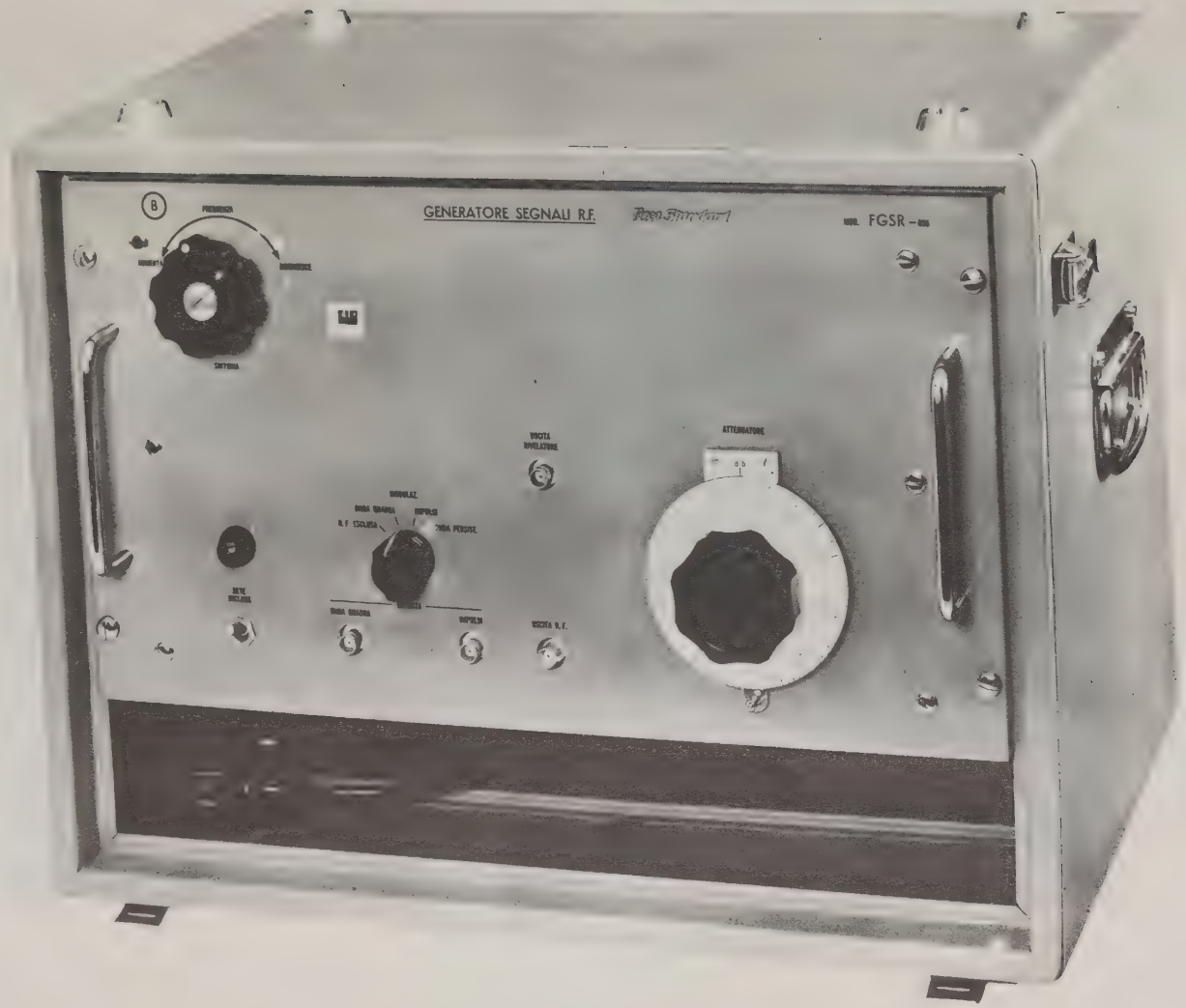


Fig.1 - RF SIGNAL GENERATOR -
FGSR - 055

FIG.2

UHF GENERATOR - FRONT VIEW

GENERATORE RF - VISTA FRONTALE

B/A

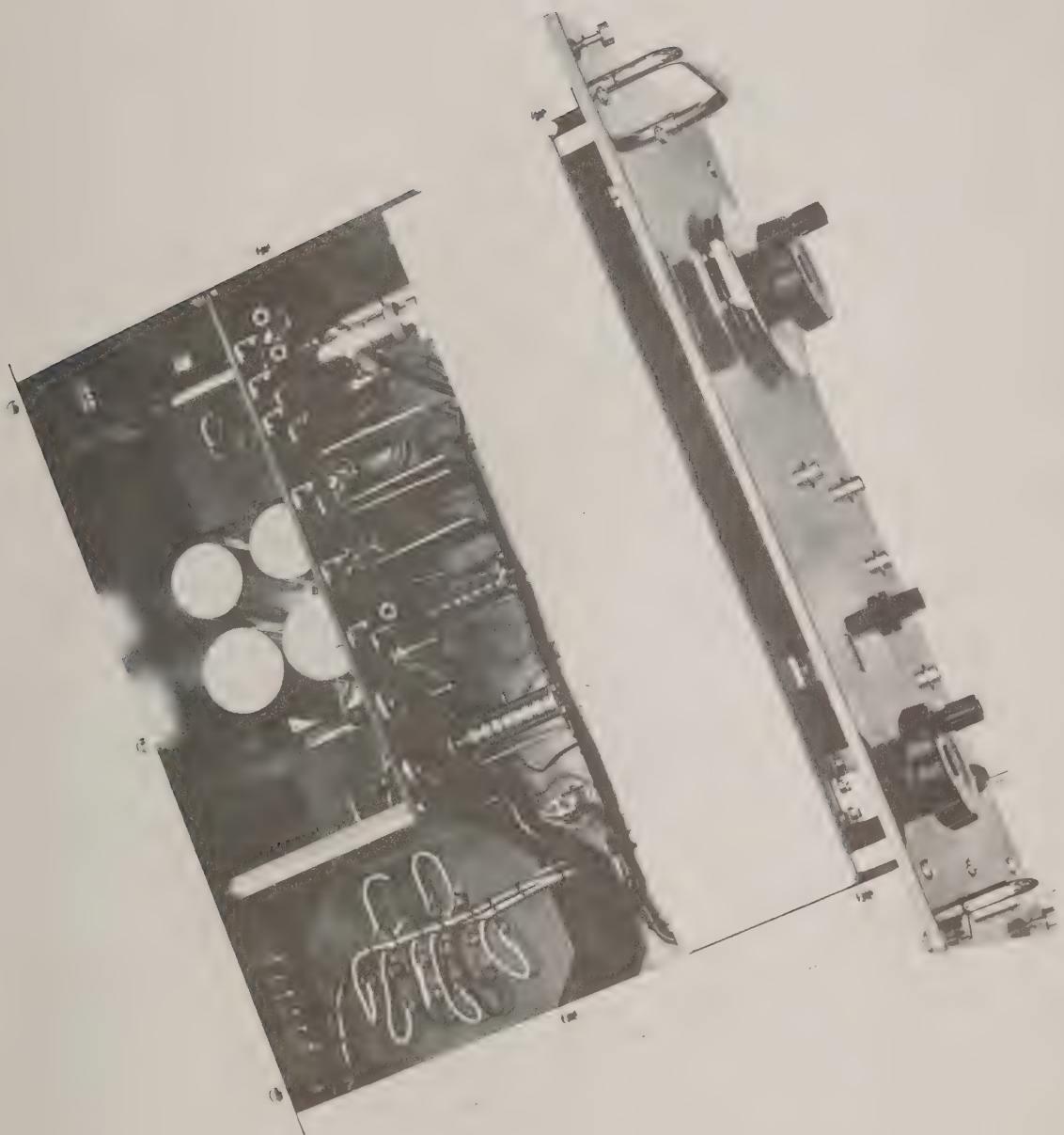


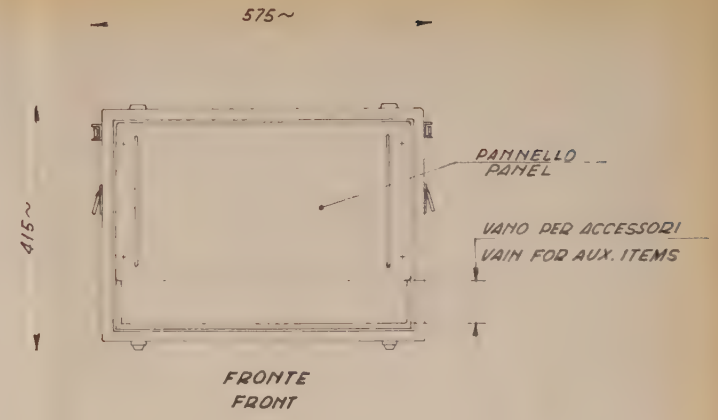
FIG.3

UHF GENERATOR - UPPER VIEW

GENERATORE RF - VISTA SUPERIORE

/A

TM 633



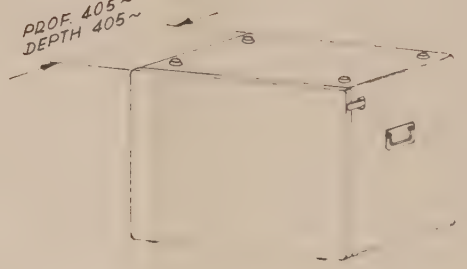


FIG. 1

Ed	DATA	RIFERIMENTI
1ª	11-5-67	

GENERAT. R.F. MOD. GSR-055 IN COFANO METALL. TRASPORTABILE

R.F. GENERATOR MOD. GSR-055 IN TRANSPORT. METAL CABINET

Fu. & Standard

SCALA

LUC | D.S.

CONT | APP

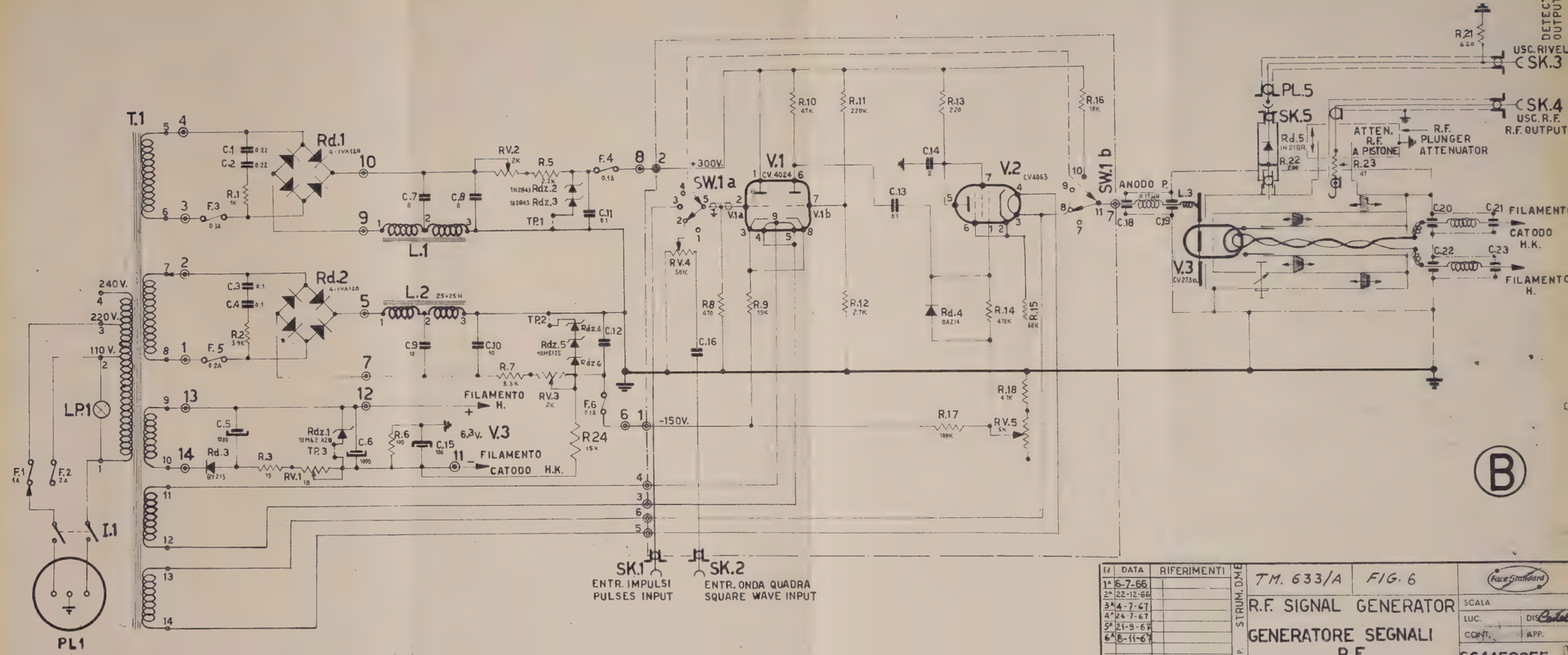
TM 633

Mod 10 - C. I. 751 - 9874010

FIG.5

GENERATORE R.F. MOD. FGSR-055
SCHEMA A BLOCCHI

R.F. GENERATOR MOD. FGSR-055
BLOCK SCHEMATIC



Ed	DATA	RIFERIMENTI
1ª	6-7-66	
2ª	22-12-66	
3ª	4-7-67	
4ª	26-7-67	
5ª	21-9-67	
6ª	8-11-67	

STRUM. D.M.E.

TM. 633/A | FIG. 6

R.F. SIGNAL GENERATOR

GENERATORE SEGNALI R.F.

Face Standard

SCALA

LUC. | DIS

CONT. | APP.

SC.1450055

TM. 635/A

RF PEAK WATTMETER
TYPE CA-058

TI.635/A

RF PEAK WATTMETER - TYPE CA-058

FABBRICA APPARECCHIATURE PER COMUNICAZIONI ELETTRICHE-STANDARD S.p.A.
MILANO - V.le Bodio 33 - Tel. 3772 - Telex 31040 - Cables FACESTANDARD - MILANO
ROMA - Via Abruzzi 25 - Tel. 463421 - Telex 61040 - Cables FACESTANDARD - ROMA
BOLOGNA - NAPOLI - PADOVA - PALERMO - MADDALONI

[illegible]

[illegible]

1. Short description

The RF peak wattmeter type [illegible] is a dummy load [illegible] mounting up in a [illegible] cabinet for the [illegible]. It is used for output power measurement from [illegible] for TACAN and DME beacons.

This load is purely resistive and composed by [illegible] coaxial cable type RG 8/U with one end loaded on a resistor 50 ohm [illegible].

The RF signal after the [illegible] diode coupler is applied to the above load.

Diode V1 is filament fed by transformer T1 [illegible] (for 115V) and [illegible] (for 220V) and connected to the mains by [illegible].

Meter M1 is an electrostatic voltmeter, [illegible] which gives a [illegible] power reading in function of the peak RF voltage. Meter is calibrated from 0 to [illegible] kW and 0 to [illegible] kV and [illegible] of the [illegible] peak power and voltage for the RF power dissipated in the 50 ohm dummy load.

2. Characteristics

Frequency range	[illegible]
Peak power	10 kW
Load	50 ohm
Metering	peak voltage and power
Valves	2-[illegible] N.1 [illegible]
Fuses	[illegible] N.1 [illegible]

3. Dimensions and Weight (rack mounting)

(h) 223 X W (483) X (d) 500 mm.

Weight Kg 30 approx.

4. ILLUSTRATIONS

5. COMPONENT LIST

SUPPLIER ADDRESSES

Dummy load

AROS	Via Bellinzaghi,17 Milano		Transformers
CANNON	Cannon Electric.Inc. Humpolit St. Los Angeles, 31 Cal. (U.S.A.)	Cannon Ital. Via Roncaglia,13 Milano	Connectors
COMAREL	Via Montepulciano,17 Milano		Lamps
EIMAC	Eitel-McCullough Inc. San Carlos,Cal.(U.S.A.)	Gallo Gorgatti Via Borromei,5 Milano	Valves
FEME	Viale Certosa,1 Milano		Switches
FACE	Face Standard Via Bodio,33 Milano		Miscellaneous
PRECISION		AME Via D'Orsenigo,15 Milano	Meters
WEBER	Emmenbrucke (Swiss)	MOLINARI Via Ampere,106 Milano	Fuses
METALLUX	Viale Sarca, 94 Milano		Resistor

[illegible]

Diagr. Ref.	Denomination	Supplier	FACE Code
F.1	Fuse 200 mA (ø 5x20 mm)	W.E.B.E.R.	9[illegible]85452
F.2	Fuse 100 mA (ø 5x20 mm)	W.E.B.E.R.	9[illegible]5451
I.1	Switch, two poles type B-10-IS (19x34x2[illegible],5 mm)	FEME	9080037
LP.1	Lamp 110÷140V type KL 10 "GLIMM" (ø 9x28 mm)	COMAREL	9082377
M.1	Meter, f.s. 1 KV (ø 110x64 mm)	PRECISION	9006278
PL.1	Plug, mains, type "SIEMENS" (ø 36,5x38 mm)	SIEMENS	9865293
PL.2	Connector (UG.573/AU) Type [illegible] (ø 19,5x37,7 mm)	CANNON	9005[illegible]
R.1	Resistor 50 ohm ± 1% 5W coaxial cable FMG 1303/57 (RG8/U) 105 mt	METALLUX	
SK.1	Connector 50 ohm composed by: connector UG 572/U series C CANNON ELECTRIC FACE code 9083019	FACE	[illegible]
SK.2	As SK1		
T.1	Transformer, power Primary: 0-110-220-[illegible]V 45÷60 c/s Secondary: 0-5V 0,4A Output power: 2 VA Mil.278, grade A, class R. Libe X. (63x63x70 mm. coax)	AROS	[illegible]

V.1	Valve, electron type 2-01-C	EMAC	9006277
XF.1-2	Fuse holder 6A max type 9102-A (19x32 mm)	FACE	3502436
XLP.1	Lamp holder type 210 red (Ø 20x43 mm)	COMAREL	9090407

FIG. 1

RF PEAK WATTMETER -FRONT VIEW-

WATTMETRO RF DI PICCO -VISTA FRONTALE-

TM.635/A

TM.635

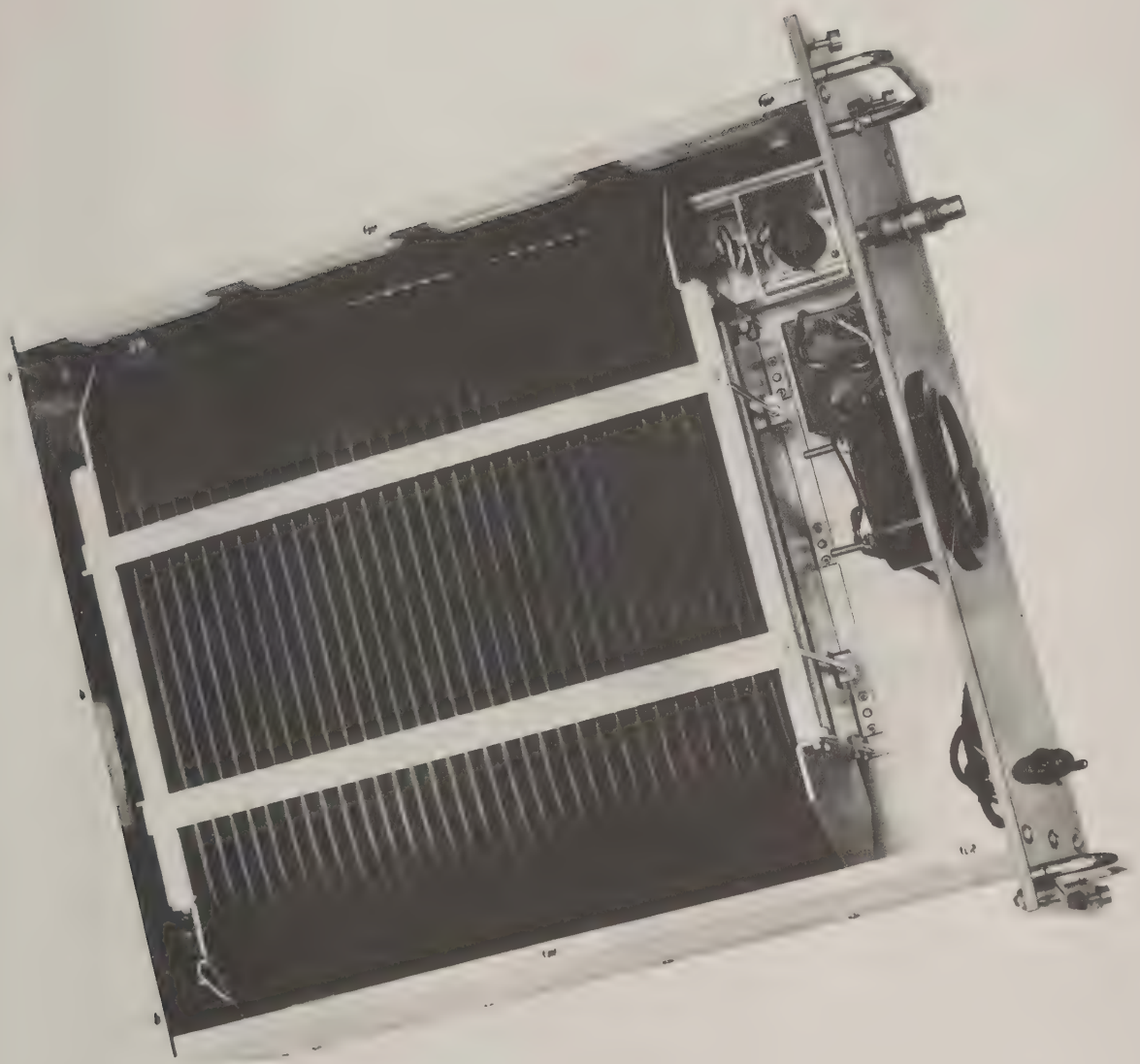


FIG. 2

RF PEAK WATTMETER -UPPER VIEW-

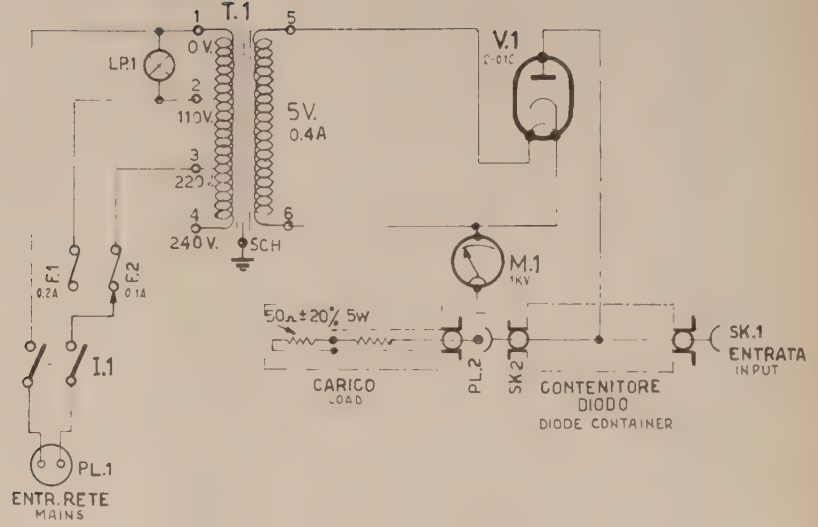
WATTMETRO RF DI PICCO - VISTA SUPERIORE-

635/A

.635

SC.1450058 TAV. 1-3

STC MARCONI



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1^	27-7-66	

STRUM. D.M.E.

IMP.

TM 635/A FIG. 3

DUMMY LOAD

CARICO ARTIFICIALE

Face Standard

SCALA

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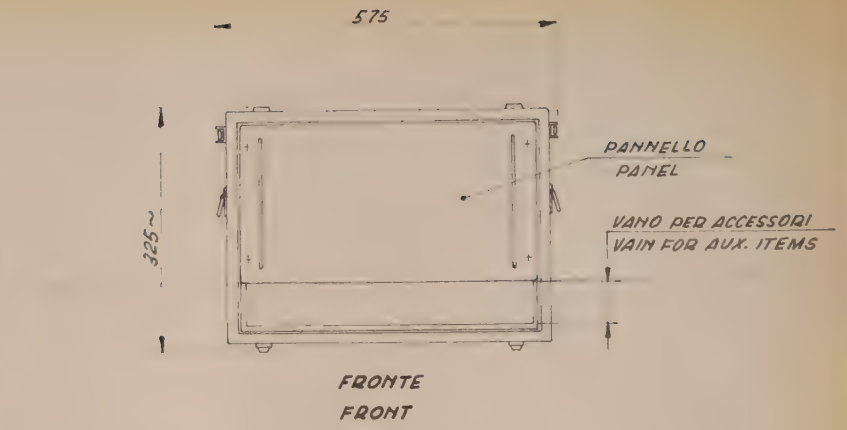
CONT. APP.

SC.1450058 TAV 1-3

TM 635



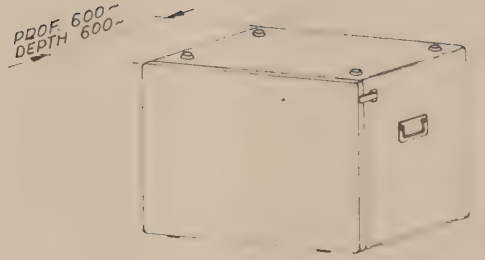


FIG. 4

Ed	DATA	RIFERIMENT.
1ª	11-5-67	

WATTMETRO R.F. DI PICCO MOD.CA-058 IN COFANO METALL. TRASPORTAB.

—O—

R.F. PEAK WATTMETER MOD.CA-058 IN TRANSPORTABLE METAL CABINET

Fuce Standard

SCALA

DIS.

LUC

CONT

APP

TM 635

IMP.

TM. 639/A

REPLY PERCENTAGE METER
TYPE FMR - 056

FABBRICA APPARECCHIATURE PER COMUNICAZIONI ELETTRICHE-STANDARD S.p.A.
MILANO - V.le Bodio 33 - Tel. 3772 - Telex 31040 - Cables FACESTANDARD - MILANO
ROMA - Via Abruzzi 25 - Tel. 463421 - Telex 61040 - Cables FACESTANDARD - ROMA
BOLOGNA - NAPOLI - PADOVA - PALERMO - MADDALONI

RIPPLY PERCENTAGE METER
TYPE FMR-056

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ILLUSTRATION

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" 3 -	Block schematic		
" 4 -	E	SC.1450056	Connections
" 5 -	EA-s	SC.4450535	Stabilizer - schematic
" 5a -	EA		Internal view (8076)
" 6 -	EB-s	SC.4450530	Invert.ampl. - interr.side - Schematic
" 6a -	EB		Internal view (3066)
" 7 -	EC-s	SC.4450531	Invert.ampl. - reply side - schematic
" 7a -	EC		Internal view (3070)
" 8 -	ED-s	SC.4450532	Interrog.decoder - schematic
" 8a -	ED		Internal view (3067)
" 9 -	EE-s	SC.4450533	Interrog.decoder and coinc.delay - schemati
" 10 -	EE-d	SC.4450534	Reply counting and calib. - schematic
" 11 -	EE	SC.2450185	Front panel
" 11a -	EE		Internal view (3072)
" 12 -	EF	SC.4450467-20V	Stabil. supply - schematic
" 13 -			Equipment in metallic transportable cabinet

REPLY PERCENTAGE METER
TYPE FMR-056

PART I - GENERAL DESCRIPTION

1.1. General

The reply percentage meter FMR-056 is an instrument designed for the reply efficiency check for DME and Tacan ground beacons.

Meter is in modular construction

The modules have many test points, is easily withdrawable and all components of the meter are easily accessible.

The full transistorization and the use of silicon semiconductors give full reliability and a low consumption.

1.2. Operational principle

The reply percentage meter receives pulse from the beacon interrogation simulator and compares them with same pulses which the beacon retransmits after having checked and delayed.

The ratio between the reply pulse number and interrogation pulses gives the reply percentage of the meter under measure.

1.3. Characteristics

Input level, interrogation and reply	≥ 1 V peak (both positive and negative)
Repetition frequency	for any beacon interrogating load
Accuracy	± 1% full scale ± 5% from [illegible] to full scale

Coincidence delay	adjustable between 35 and 50 µs
Power supply	110-220-240 V ± 10% 45-65 c/s 15 W approx
Temperature range	-10° to +50°C

Dimensions and weight (without handles)	lenght	depth	height(mm.)	weight(Kg)
only panel	483	302	178	6
with cabinet	515	402	315	12

1.4. Miscellaneous

Transistors	16	V746 SGS
	12	2N708 SGS
Diodes	25	SG60 SGS
Zener	1	BZZ20 PHILIPS
	1	BZZ15 "
	1	10M 3,9 A Z10 MOTOROLA
	2	Z1K INTERMETAL
Fuses	1	0,3A 5x20
	1	0,5A 5x20

1.5. Construction

The meter consists of a 19" unit suitable for standard rack, by a chassis and ISEP printed board with multiple plugs. Printed boards are mounted in withdrawable modules from panel front easily inspectionable.

Below the 5 modules on the front are controls, fuses, in the back wall is the stabilized supply(MF.)

'n right is an indicator meter of the moisture percentage.
The unit may also be used on a bench or portable, therefore in this version is housed in a metal cabinet with front and back covers for water tight inspection. The housing has a lower compartment for supply connections, instruction book and calibration charts. The unit has 2 handles for transportation the front cover is easily withdrawable opening two hinges

PART II - OPERATION DESCRIPTION

2.1. Operation

The block schematic is in fig.3

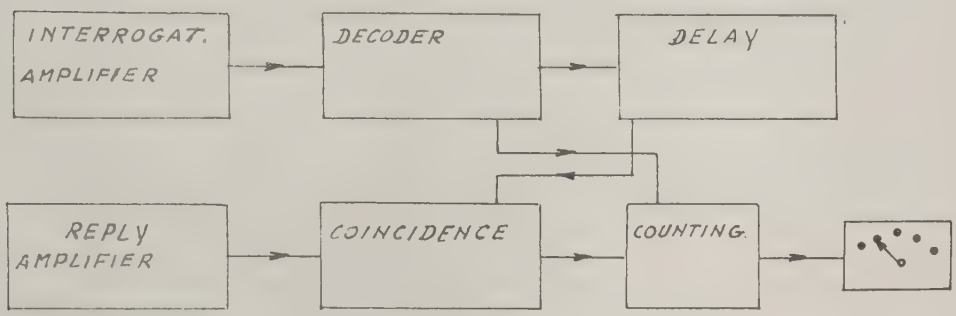


Fig.3

The two input amplifiers interrogation and reply, receive both positive and negative pulses, previous presetting.
The decoder recognizes the interrogation pairs coded 12 /us or 36 /us previously "X" and "Y" preset and also is a clock for the counting logic circuit. In the delay circuit the decoded pulses are delayed for the correct overall delay of the beacon under measure and applied to the coincidence circuit where arrive amplified and squares also the reply pulses.
The counting realized with logic circuits gives the difference between interrogation pulses (clock) and reply pulses in correct coincidence.
The reading on the meter is the reply percentage of the beacon.

2.2. Detailed description of the units

Fig.1 and 2 show the construction of the reply meter : transformer, power supply, controls, etc.

2.2.1. (AA)-s Stabilizer (fig.5)

Consists of a serie of Zener diodes and resistors derived from -20 V. to obtain the following stabilized supplies : -10 V, -5V -4V, -1V.

2.2.2. (BB)-s Inverter amplifier interrogation side (fig.6)

The detected interrogation signal comes from the input switch of the meter I3 to transistor V1 of the amplifier if negative and directly to V2 if positive.

Transistor V1 operates as amplifier and the signal from its output, via I1 is applied to V2 base.

The transistors V2 and V3 operate as limiters by means of diodes Rd2 and Rd4 so the V3 signal output amplitude is constant changing the input level. V4 is an amplifier and V5 is used as an inverter and the output signal level is limited by Rd6 at 6V.

2.2.3. (CC)-s Inverter amplifier reply side (fig.7)

It is identical to (BB)-s unit, only the polarity preset at the meter input is effected via I4.

2.2.4. (DD)-s Interrogation decoder (fig.8)

The pulse pair amplified and squared by (BB)-s arrives in the same time to C1 and C6. The rising front of the first pulse triggers the monostable with transistors V1, V2 and V3.

The monostable pulse duration is adjusted by RV1 or RV2 according to the I2 switch position in front of the panel which presets the decodification for 12 /us "X" or 36 /us "Y". I2 presets also the monostable condensors C3 and C4 for the time constant. The output signal from V3 via Rd4, biassed to eliminate the unsquared part of the pulse, is applied to V4 base where is amplified.

The resulting negative signal is applied to V5 base.
V5 and V6 have the common collector resistor and normally are cut-off. The two signals coincidence on their bases modifies the collector voltage.
In our case the coincidence occurs with the rising front of the monostable negative pulse on V5 base and the second pulse of the pair on V6 base.

The signal so described is amplified by V7.

2.2.5. (ED)-s Interrogation delay and coincidence (fig.9)

The decoded pulse by (ED)-s via C1 triggers the monostable consisting of transistors V1, V2 and V3 which time is adjusted in steps by SW1 and fine by RV1.

The time constant capacitor C2 has fixed value.

The output signal from V3 via Rd4, so polarized to eliminate the unsquared part of the pulse is amplified by V4 which output, negative, is applied to V5 base.

The rising front of the pulse cancels the V5 saturation.

The reply pair coincidence on V6 base modifies the voltage on common collector resistor of the two transistors.

The coincidence occurs adjusting the monostable pulse duration. The monostable pulses via C5 are applied to the interrogating connector placed on panel front.

2.2.6. (EE)-d Reply counting and calibration (fig.10)

Consists of two "flip-flop" circuits V1-V2; V3-V4 and transistor V5, which average current gives on the M1 meter the reply percentage.

The "flip-flop" V1-V2 inverts each time arrives a reply to V1 base and an interrogation pulse on V2 base.

This inversion presets the "flip-flop" V3-V4 which inverts to the interrogation pulse arriving on their bases only in the case that reply pulses are missing on V1 base. Each inversion of V3-V4 flip-flop blocks transistor V5.

V5 current for the M1 meter full scale calibration is adjusted by RV1 mounted on the panel front where are also provided two push buttons I5 and I6 to control on signal absence condition the "flip-flop" V3-V4 and then the full scale calibration and meter zeroing.

The reply pulses via C4 are applied to the reply counting connector placed on panel front. The front panel of the module (EE) is connected as fig.11.

2.2.7. (AA) -28V stabilized supply unit (fig.12)

The power supply is stabilized both for load changes and supply changes. The power transistor V8 is in series to the load and is driven by V7 on which base are applied the output voltage changes via V1, V2, V3, V4, V5 and supply ch... via V6.

By RV1 the output voltage is adjusted to the required figure. An output voltage change causes a V2 base voltage change, then a current change which causes a V3 current change, V3 base is hold to a constant value by Zener Rdz3.

The V3 collector output drives transistor V4 directly on the base. The V2 collector output drives directly the V1 base, V1 has common emitter with V4.

The current change on V4 transistor causes an internal resistance change of transistor V7 which operates as load of V4. Such change causes a voltage change between collector and emitter and by consequence a voltage change between V8 base and collector, which will change its current and will adjust the output voltage.

To improve the adjustment is also included at the input a variable load R6, V5, R8. In fact a voltage change on the load causes a voltage change at the V5 emitter, and by consequence a current change which causes a voltage change at R16 ends. Such change is applied to V7 and V8 collectors.

The input changes are amplified by V8 which has (as V4) the transistor V7 as a load.

2.3. Operating instructions

2.3.1. Power supply

The equipment is prepared for a 220 V mains.

For 110 V. mains it is necessary to remove the link between fuse F2 and switch I1 and set it between fuse F1 and switch I1.

2.3.2. Calibration

Push the button [illegible] (full scale calibration) and adjust [illegible] to read [illegible] on [illegible] meter. Push button [illegible] (zeroing) is used to zero reset the meter.

2.3.3. Interrogator

The interrogation signal must be the same which modulates the RF generator for the beacon interrogation.
Using the FACE pulse generator FGI-057 connect a T junction to the pulse generator output in a way to send the same signal both to the RF generator, and to reply meter interrogation. With interrogation signal included the meter must always come back to zero for any interrogation frequency.
Using the RF generator FACE FGSR-055 the modulation pulse polarity is positive, then switch the I3 on "positive".
In case adverse set I3 to the right polarity.

Switch I2 serves to preset the meter to accept 12 µs pulses (channels "X") or 36 µs (channels "Y").
It is possible to check by counter the interrogation frequency switching it on SK2 (counter).

2.3.4. Reply

The reply signal may be taken in any point of video circuit of beacon under control after decodification.
[illegible] is used to preset the input for the correct polarity.
The coincidence between interrogation and reply pulse is effected with the (EE) switch for a course adjustment and with the potentiometer ([illegible]) mounted on ([illegible]) front for a fine adjustment.

It is possible to check using a counter the reply pulses including it in SK4 (counter).
The reply pulses percentage compared with interrogation pulses must correspond to the indication on M1 meter.

SUPPLIER ADDRESSES

Reply meter

AROS	Via Bellinzaghi,17 Milano		Transformers
BOURNS	1200 Columbia Avenue Riverside - California (U.S.A.)	Special-Ind. Via Manin,33 Milano	Potentiometers
COMAREL	Via Montepulciano,17 Milano		Lamps
EL-MENCO (See Note)	The Electromotive MFG.Co. Willimantic - Connect. (U.S.A.)	MARANO A.V. Via Quadronno,4 Milano	Capacitors
FEME	V.le Certosa,1 Milano		Switches
FACE	Face Standard Via L.Bodio,33 Milano		Miscellaneous
GALVANESE	Via M.Gioia, 80 Milano		Connectors
ICE	Via Rutiglia,12/18 Milano		Meters
ICAR	C.so Magenta, 65 Milano		Capacitors
INTERMETAL	H.Buntestr. Freiburg i.Breisgau Germ.	ITT Standard P.za De Angelis,7 Milano	Semiconductors
MIAL	Via Ronchi,16 Milano		Capacitors
METAL-LUX	V.le Sarca,94 Milano		Resistors

MOTOROLA	Semiconduct.Products 5005 East Mc Dowel Rd. Phoenix Arizona (U.S.A.)	Metroelettronica Via Cirene, 18 Milano	Diodes
PHILIPS	Eindhoven (Holland)	Philips P.zza IV Novembre, Milano	Capacitors
PLESSEY	Ilford Essex (England)	Via F.Turati,3 Milano	Potentiometers
SECI	Via G.B.Grassi, 97 Milano		Resistors
SECME	13, Rue des Envierges Paris (France)	De Mico Via Manzoni,31 Milano	Switches
SIEMENS	Hoffmann Str.51 Monaco (Germ.)	Siemens Via F.Filzi,29 Milano	Capacitors
SILVERSTAR	Via dei Gracchi,10 Milano		[illegible]
SGS	Via Restelli, 3 Milano		Semiconductors
STR	Standard Radio Seestrasse 395 Zurich (Swiss)	Face Standard Via L.Bodio,33 Milano	Capacitors
VLMM	Via Figino,16 Milano		[illegible]
WEBER	Emmenbrucke (Swiss)	Molinari Via Ampere,106 Milano	Fuses

Note : - 1- [illegible] capacitors [illegible] replaced by [illegible] or [illegible]
[illegible] - Paris [illegible]

Reply meter (E) 1450056

Diagr. Ref.	Denomination	Supplier	FACE Code
C1	Capacitor, polyester 0.47 µF ± 20% 150 WV d.c. Working temp. -25 +125°C Type MPTI (Ø 13x28 mm.)	FACE	5699105
C2	As C1		
F1	Fuse 300 mA (Ø 5 x 20 mm)	WEBER	9085454
F2	Fuse 500 mA (Ø 5 x 20 mm)	WEBER	9085455
I1	Switch, two poles Type B10-IS (19 x 34 x 29.5 mm)	FEME	9080037
I2	Switch, two poles miniature Type 17013 DJET L (12 x 16 x 30.9 mm)	SECME	9005360
I3	As I2		
I4	As I2		
I5	Switch, single pole Type 17501 DJET (Ø 14 x 28 mm)	DE MICO	9005361
I6	As I5		
LP1	Lamp, neon, micromignon 110 to 140 V Type KL.10 "GLIMM" (Ø 9 x 28 mm)	COMAREL	9082377

Reply Meter (E) 1450056

Diagr. Ref.	Denomination	Supplier	FACE Code
M1	Meter 2 mA Mod.360, moving coil, for d.c. pulses, scale 50 divisions, as follows : 0-20-40-60-80-100%; "REPLY" indic.at scale center, class 1.5 knife indicator (90 x 80 x 47 mm)	ICE	9082995
PL1	Plug, Type "SIEMENS" (36.5 x 38 mm)	SIEMENS	9865293
R1	Resistor, layer 3.92 kohm ± 1% 1/2 W Type A.T. (Ø 5 x 20 mm)	METALLUX	9948358
RV1	Potentiometer, linear, miniature 2.5 kohm ± 20% 0.25 W at 85 °C Range temp. -55 °C to +85 °C Type "L" (Ø 12.7 x 52.6 mm)	PLESSEY	9006241
SK1 to4	Connector, coax. BNC Type AN-UG-1094/U (CH.12.7 x 27 mm)	VEAM SILVERSTAR	9082611
T1	Transformer, single phase : 32 VA - 45 to 65 c/s Primary : Tag. 1-2-110 V; 1-3-220 V; 1-4-240 V Secondary: Tag. 5-6-28 V 1A; 5-7-30 V; 5-8-32 V 1A Temp.range: -26 °C to +55 °C Humidity 95% insul. Cl.A (72 x 83 x 124 mm)	AROS	9006247
XF.1-2	Fuseholder 6 Amp. max. Type 9102-A (Ø 19 x 32 mm)	FACE	3502436
XLP.1	Lamp-holder Type 210 red (Ø 20 x 45 mm)	COMAREL	9080407

-10.-6.-4.-1 V Stabilized Power Supply (EA)s 4450535

Diagr. Ref.	Denominations	Supplier	FACE Code
C1	Capacitor, electrolitic 1000 µF 6 V Type Z.6167B/1000/6 (Ø 22 x 48 mm)	STR	9085192
PL1	Connector, male 21 poles (8 x 9 x 65 mm)	FACE	6500459
R1	Resistor, wire adjustable 400 ohm ± 10% 10 W Type R.V.R. (Ø 9.5 x 45 mm)	SECI	9006246
R2	As R1		
R3	As R1		
R4	Resistor, layer 150 ohm ± 5% 1 W (Ø 6.7 x 16 mm)	SECI	9980205
Rdz.1	Diode, Zener Type BZZ.20 (CH. 11.11 x 31.3 mm)	PHILIPS	9006243
Rdz.2	Diode, Zener 6 V Type BZZ.15 (CH.11 x 31.3 mm)	PHILIPS	9005980
Rdz.3	Diode, Zener (selected 4 V $^{-0}_{+0.5\ V}$) Type 10 M 3.9 AZ10	MOTOROLA	9006244
Rdz.4	Diode, Zener Type Z1.K	INTERMETAL	9006299
Rdz.5	As Rdz.4		
TP1 to 5	Test point (Ø 7 x 29 mm)	CALVANESE	9004211

Invert. Amplif. Interrogation side (EB)-s 4450530

Diagr. Ref.	Denomination	Supplier	FACE Code
C1	Capacitor, mica 470 pF ± 1% 500 WV Type DM.15-4 CR (11.6 x 9.6 x 5 mm)	EL MENCO	9006281
C2	Capacitor, mica 4000 pF ± 1% 500 WV Type DM.19-4 CR (18 x 13.2 x 6 mm)	EL MENCO	9005238
C3	Capacitor, mica 2000 pF ± 1% 500 WV Type DM.19-4 CR (18 x 13.2 x 6 mm)	EL MENCO	9005453
C4	Capacitor, mica 100 pF ± 1% 500 WV Type DM.10-4 CR (8 x 6.35 x 3.57 mm)	EL MENCO	9005177
PL1	Connector, male 21 poles (8 x 9 x 65 mm)	FACE	6500459
R1	Resistor, layer 3.9 kohm ± 5% 1/2 W (Ø 4.1 x 10.5 mm)	SECI	9977315
R2	Resistor, layer 22 kohm ± 5% 1/2 W (Ø 4.1 x 10.5 mm)	SECI	9977409
R3	As R1		
R4	Resistor, layer 1.5 kohm ± 5% 1/2 W (Ø 4.1 x 10.5 mm)	SECI	9977305
R5	Resistor, layer 120 ohm ± 5% 1/2 W (Ø 4.1 x 10.5 mm)	SECI	9977203
R6	Resistor, layer 4.7 kohm ± 5% 1/2 W (Ø 4.1 x 10.5 mm)	SECI	9977317
R7	Resistor, layer 1 kohm ± 5% 1/2 W (Ø 4.1 x 10.5 mm)	SECI	9977301

Invert. Amplif. Interrogation side (EB)s 4450530

Diagr. Ref.	Denomination	Supplier	FACE Code
R8	Resistor, layer 33 kohm ± 5% 1/2 W (Ø 4.1 x 10.5 mm)	SECI	9977413
R9	As R1		
R10	Resistor, layer 3.3 kohm ± 5% 1/2 W (Ø 4.1 x 10.5 mm)	SECI	9977313
R11	As R10		
R12	Resistor, layer 220 ohm ± 5% 1/2 W (Ø 4.1 x 10.5 mm)	SECI	9977209
R13	As R10		
R14	Resistor, layer 1.2 kohm ± 5% 1/2 W (Ø 4.1 x 10.5 mm)	SECI	9977303
R15	As R1		
R16	As R10		
R17	As R2		
R18	As R1		
R19	As R10		
R20	As R10		
Rd1	Rectifier, silicium Type SGS50	SGS	9004209
Rd2	As Rd1		

Invert. Amplif. Interrogation side (EB)s 4450530

Diagr. Ref.	Denomination	Supplier	FACE Code
Rd.3	As Rd1		
Rd4	As Rd1		
Rd5	As Rd1		
TP1 to 5	Test point, miniature Type 5310, black (Ø 7 x 20 mm)	CALVANESE	9004211
V1	Transistor P.N.P. Type V.746	SGS	9005143
V2	As V1		
V3	Transistor N.P.N. Type 2N708	SGS	9082773
V4	As V1		
V5	As V1		

Invert. Amplif. Reply Side (EC)-s 4.450.531

Diagr. Ref.	Denomination	Supplier	FACE Code
C1	Capacitor, mica 470 pF ± 1% 500WV Type DM15-4CR (11.6x9.6x5 mm)	EL MENCO	9006281
C2	Capacitor, mica 4000 pF ± 1% 500WV Type DM.19-4CR (18x13.2x6 mm)	EL MENCO	9005238
C3	Capacitor, mica 2000 pF ± 1% 500WV Type DM.19-4CR (18x13.2x6 mm)	EL MENCO	9005453
C4	Capacitor, mica 100 pF ± 1% 500 WV Type DM.10-4CR (8x6.35x3.57 mm)	EL MENCO	9005177
PL1	Connector, male 21 poles (8 x 9 x 65 mm)	FACE	6500469
R1	Resistor, layer 3.9 kohm ± 5% 1/2 W (Ø 4.1 x 10.5 mm)	SECI	9977315
R2	Resistor, layer 22 kohm ± 5% 1/2 W (Ø 4.1 x 10.5 mm)	SECI	9977409
R3	As R1		
R4	Resistor, layer 1.5 kohm ± 5% 1/2 W (Ø 4.1 x 10.5 mm)	SECI	9977305
R5	Resistor, layer 120 ohm ± 5% 1/2 W (Ø 4.1 x 10.5 mm)	SECI	9977203
R6	Resistor, layer 4.7 kohm ± 5% 1/2 W (Ø 4.1 x 10.5 mm)	SECI	9977317
R7	Resistor, layer 1 kohm ± 5% 1/2 W (Ø 4.1 x 10.5 mm)	SECI	9977301

Invert. Amplif. Reply Side (EC)-s 4.450.531

Diagr. Ref.	Denomination	Supplier	FACE Code
R8	Resistor, layer 33 kohm ± 5% 1/2 W (Ø 4.1 x 10.5 mm)	SECI	9977413
R9	As R1		
R10	Resistor, layer 3.3 kohm ± 5% 1/2 W (Ø 4.1 x 10.5 mm)	SECI	9977313
R11	As R10		
R12	Resistor, layer 220 ohm ± 5% 1/2 W (Ø 4.1 x 10.5 mm)	SECI	9977209
R13	As R10		
R14	Resistor, layer 1.2 kohm ± 5% 1/2 W (Ø 4.1 x 10.5 mm)	SECI	9977303
R15	As R1		
R16	As R10		
R17	As R2		
R18	As R1		
R19	As R10		
R20	As R10		
Rd1 to 4	Rectifier, silicium Type SGS60	SGS	9004209
TP1 to 5	Test point (miniature) Type 5310, black (Ø 7 x 20 mm)	CALVANESE	9004211

Invert. Amplif. Reply Side (EC)-s 4.450.531

Diagr. Ref.	Denomination	Supplier	FACE Code
V1	Transistor, PNP Type V746	SGS	9005143
V2	As V1		
V3	Transistor NPN Type 2N708	SGS	9082773
V4	As V1		
V5	As V1		

Interrogation Decoder (DD)s 4.450.532

Diagr. Ref.	Denomination	Supplier	FACB Code
C1	Capacitor, mica 100 pF ± 1% 500WV Type DM.10-4CR (8 x 6.35 x 3.57mm)	EL-MENCO	9005177
C2	Capacitor, mica 33 pF ± 5% 500 WV Type DM.10-4CR (8 x 6.35 x 3.57 mm)	EL-MENCO	9005343
C3	Capacitor, mica 700 pF ± 1% 300 WV Type DM.15-4CR (12x9.6x5.95 mm)	EL-MENCO	9005187
C4	Capacitor, mica 2700 pF ± 1% 500WV Type DM.15-4CR (18x13.2x6 mm)	EL-MENCO	9006239
C5	Capacitor, mica 220 pF ± 1% 500 WV Type DM.15-4CR (12x9.6x4.7 mm)	EL-MENCO	9006238
C6	Capacitor, mica 1000 pF ± 1% 500 WV Type DM.19-4CR (18x13.2x5 mm)	EL-MENCO	9005246
C7	As C1		
PL1	Connector, male, 21 poles (8 x 9 x 65 mm)	FACB	6500459
R1	Resistor, layer 68 kohm ± 5% 1/2 W (Ø 4.1 x 10.5 mm)	SIOI	9977421
R2	Resistor, layer 51 kohm ± 5% 1/2 W (Ø 4.1 x 10.5 mm)	SIOI	9977416
R3	Resistor, layer 2.2 kohm ± 5% 1/2 W (Ø 4.1 x 10.5 mm)	SIOI	9977309
R4	Resistor, layer 1.8 kohm ± 5% 1/2 W (Ø 4.1 x 10.5 mm)	SIOI	9977307
R5	Resistor, layer 3.3 kohm ± 5% 1/2 W (Ø 4.1 x 10.5 mm)	SIOI	9977313

Interrogation Decoder (ID)- 4.450.532

Diagr. Ref.	Denomination	Supplier	FACE Code
R6	Resistor, layer 10 kohm ± 5% 1/2 W (Ø 4.1 x 10.5 mm)	SECI	9977401
R7	Resistor, layer 3.9 kohm ± 5% 1/2 W (Ø 4.1 x 10.5 mm)	SECI	9977315
R8	As R5		
R9	Resistor, layer 20 Kohm ± 1% 1/2W Type AT (Ø 5 x 20 mm.)	SECI	9978430
R10	Resistor, layer 15 kohm ± 5% 1/2 W (Ø 4.1 x 10.5 mm)	SECI	9977405
R11	As R7		
R12	As R5		
R13	Resistor, layer 22 kohm ± 5% 1/2 W (Ø 4.1 x 10.5 mm)	SECI	9977409
R14	Resistor, layer 33 kohm ± 5% 1/2 W (Ø 4.1 x 10.5 mm)	SECI	9977413
R15	As R7		
R16	As R5		
R17	As R13		
R18	As R13		
R19	As R13		
R20	As R7		

Interrogation Decoder (ED)-s 4.450.532

Diagr. Ref.	Denomination	Supplier	FACE Code
R21	As R5		
R22	Resistor, layer, 1200 ohm ± 5% 1/2W	SECI	9977303
Rd1 to 6	Rectifier, silicium Type S.G.S. 60	SGS	9004209
RV1	Resistor variable, 5 Kohm type 275-1-502-5K	BOURNS	9005160
RV2	Resistor variable, 20 Kohm type 81-203-20K	BOURNS	9005170
TP1 to 5	Test point, (miniature) type 5310 Black (Ø 7x20)	CALVANESE	9004211
V1	Transitor, NPN Type 2N708	SGS	9082773
V2	As V1		
V3	Transistor, PNP Type V746	SGS	9005143
V4	As V3		
V5	As V3		
V6	As V3		
V7	As V1		

Interrogation delay reply counting and coincidence calibration
(EE) 2450185

Diagr. Ref.	Denomination	Supplier	FACE Code
RV.1	Resistor, variable 5 kohm ± 20% 0.25 W Type 224-1-502-5 K (6.5 x 8 x 32 mm)	BOURNS	9006300
SW.1	Switch, 1 way, 6 positions 1 sector Type PS (From LARIR Code : 9082304) Shaft lenght modified (Ø 25 x 36 mm)	FACE	7434721

Interrogation delay and coincidence (IDC)-s 4.450.533

Diagr. Ref.	Denomination	Supplier	FACE Code
C1	Capacitor, mica 100 pF ± 1% 500 WV Type DM.10-4CR (8 x 6.35 x 3.57 mm)	EL-MENCO	9005177
C2	Capacitor, mica 3000 pF ± 1% 500 WV Type DM.19-4CR (18 x 13.2 x 6 mm)	EL-MENCO	9005454
C3	Capacitor, mica 500 pF ± 1% 500 WV Type DM.15-4CR (12x9.6 x 5.5 mm)	EL-MENCO	9005434
C4	As C3		
C5	Capacitor, mica 180 pF ± 1% 500 WV Type DM.10-4CR (8 x 6.35 x 3.57 mm)	EL-MENCO	9005179
C3-A! C4-A!	Capacitor, mica (10-20-30-40 pF) (inspect. dept.)		
PL1	Connector, male 21 poles (8 x 9 x 65 mm)	FACE	6500459
R1	Resistor, layer 10 kohm ± 5% 1/2 W (Ø 4.1 x 10.5 mm)	SECI	9977401
R2	Resistor, layer 2.2 kohm ± 5% 1/2 W (Ø 4.1 x 10.5 mm)	SECI	9977309
R3	Resistor, layer 3.3 kohm ± 5% 1/2 W (Ø 4.1 x 10.5 mm)	SECI	9977313
R4	Resistor, layer 1.8 kohm ± 5% 1/2 W (Ø 4.1 x 10.5 mm)	SECI	9977307
R5	As R1		

Interrogation delay and coincidence (ED)-s 4.450.533

Diagr. Ref.	Denomination	Supplier	FACO Code
R6	Resistor, layer 3.9 kohm ± 5% 1/2 W (Ø 4.1 x 10.5 mm)	SECI	9977315
R7	As R3		
R8	Resistor, layer 15 kohm ± 5% 1/2 W (Ø 4.1x10.5 mm)	SECI	9977405
R9	Resistor, layer 12.4 kohm ± 1% 1/2 W Type A.T. (Ø 5 x 20 mm)	METAL-LUX	9948410
R10	Resistor, layer 15 kohm ± 1% 1/2 W Type A.T. (Ø 5 x 20 mm)	METAL-LUX	9948418
R11	Resistor, layer 16.9 kohm ± 1% 1/2 W Type A.T. (Ø 5 x 20 mm)	METAL-LUX	9948423
R12	As R11		
R13	Resistor, layer 19.1 kohm ± 1% 1/2 W Type A.T. (Ø 5 x 20 mm)	METAL-LUX	9948428
R14	Resistor, layer 21.5 kohm ± 1% 1/2 W Type A.T. (Ø 5 x 20 mm)	METAL-LUX	9948433
R15	As R6		
R16	As R3		
R17	Resistor, layer 22 kohm ± 5% 1/2 W (Ø 4.1 x 10.5 mm)	SECI	9977409
R18	Resistor, layer 33 kohm ± 5% 1/2 W (Ø 4.1 x 10.5 mm)	SECI	9977413
R19	As R6		

Interrogation delay and coincidence (DE)-[illegible]

Diagr. Ref.	Denomination	Supplier	FAC. Code
R20	As R17		
R21	As R3		
Rd1 to 6	Rectifier, silicium Type SGS.60	SGS	9004209
RV1	Resistor, variable 5 Kohm type [illegible]-L-1-5023K	[illegible]	[illegible]
TP1 to 4	Test point (miniature) (Type 5310, black (Ø 7x20 mm.)	CALVANESE	900421
V1	Transistor NPN Type [illegible]	SGS	908277
V2	As V1		
V3	Transistor PNP Type V746	SGS	9005143
V4	As V3		
V5	As V3		
V6	As V3		

Reply counting and calibration (ED)-d 4.450.534

Diagr. Ref.	Denomination	Supplier	FACE Code
C1	Capacitor, mica 220 pF ± 1% 500 WV Type DM.15-4CR (12 x 9.6 x 4.7 mm)	EL-MENCO	9006238
C2	As C1		
C3	As C1		
C4	Capacitor, mica 180 pF ± 1% 500 WV Type DM.10-4CR (8 x 6.35 x 3.57 mm)	EL-MENCO	9005179
PL2	Connector, male, 21 poles (8 x 9 x 65 mm)	FACE	6500459
R1	Resistor, layer 3.3 kohm ± 5% 1/2 W (Ø 4.1 x 10.5 mm)	SECI	9977313
R2	Resistor, layer 3.9 kohm ± 5% 1/2 W (Ø 4.1 x 10.5 mm)	SECI	9977315
R3	Resistor, layer 6.8 kohm ± 5% 1/2 W (Ø 4.1 x 10.5 mm)	SECI	9977321
R4	Resistor, layer 33 kohm ± 5% 1/2 W (Ø 4.1 x 10.5 mm)	SECI	9977413
R5	Resistor, layer 22 kohm ± 5% 1/2 W (Ø 4.1 x 10.5 mm)	SECI	9977409
R6	As R5		
R7	As R3		
R8	As R4		

Reply counting and calibration (RM)-d 4.452.5?4

Diagr. Ref.	Denominations	Supplier	FACE Code
R9	As R2		
R10	Resistor, layer 10 kohm ± 5% 1/2 W (Ø 4.1 x 10.5 mm)	SIOI	9977491
R11	As R1		
R12	As R1		
R13	As R2		
R14	As R3		
R15	As R5		
R16	As R5		
R17	As R3		
R18	As R2		
R19	As R1		
R20	Resistor, layer 39 kohm ± 5% 1/2 W (Ø 4.1 x 10.5 mm)	SIOI	[illegible]
R21	As R5		
R22	As R1		
Rd1	Rectifier, silicium Type [illegible]	[illegible]	[illegible]

Reply counting and calibration (EE)-d 4.450.534

Diagr. Ref.	Denomination	Supplier	FACE Code
Rd2	As Rd1		
Rd3	As Rd1		
Rd4	As Rd1		
TP5 to 9	Test point (miniature) Type 5310 Black (Ø 7 x 20 mm)	CALVANESE	9004211
V1 to 5	Transistor, NPN, Type 2N708	SGS	9082773

-10V STABILIZED SUPPLY (3D) 4.460.467
(EF) (x)

Diagr. Ref.	Denomination	Supplier	FACE Code
C.1	Capacitor, electrolitic 250 µF ± 10% 100÷110WV type B 41010A-9257-S (ø 20x56 mm.)	SIEMENS	9005384
C.2	Capacitor, electrolitic 1000 µF +50% -20% 35÷40 WV type B41010A 7108-S (ø 20x56 mm.)	SIEMENS	9005383
R.1	Resistor, layer 4,75 Kohm ± 1% 1W (ø 4,1x6 mm.)	SECI	9981366
R.2	As R1		
R.3	Resistor, layer 1,3 Kohm ± 1% 1/2W (ø 4,1x10,5 mm.)	SECI	9978312
R.4	As R1		
R.5	Resistor, layer 619 ohm ± 1% 1/2W (ø 4,1x10,5 mm.)	SECI	9978277
R.6	" " 221 ohm ± 1% 1/2W (ø 4,1x10,5 mm.)	SECI	9978234
R.7	" " 4,75 Kohm ± 1% 1/2W (ø 4,1x10,5 mm.)	SECI	9978366
R.8	" " 2 Kohm ± 1% 1/2W (ø 4,1x10,5 mm.)	SECI	9978330
R.9	" " 11 Kohm ± 1% 1/2W (ø 4,1x10,5 mm.)	SECI	9978405
R.10	" " 3,65 Kohm ± 1% 1/2W (ø 4,1x10,5 mm.)	SECI	9978355
R.11	" " 3,32 Kohm ± 1% 1/2W (ø 4,1x10,5 mm.)	SECI	9978351
R.12	As R11		

Diagr. Ref.	Denomination	Supplier	FACE Code
R.13	Resistor, layer 10 Kohm ± 1% 1/2W (ø 4,1x10,5 mm.)	SECI	9978401
R.14	" " 2,74 Kohm ± 1% 1/2W (ø 4,1x10,5 mm.)	SECI	9978343
R.15	" " 1 Kohm ± 1% 1/2W (ø 4,1x10,5 mm.)	SECI	9978301
R.16	" " 2 ohm ± 1% 1/2W (ø 4,1x10,5 mm.)	SECI	9978030
Rd.1	Rectifier, silicium type SGS.60	SGS	9004209
Rd.2	Rectifier, silicium type BYZ.13	PHILIPS	9082743
Rd.3	As Rd.2		
Rd.4	As Rd.2		
Rd.5	As Rd.2		
Rdz.1	Diode, Zener, type ZF.6,2	INTERMETAL	9005353
Rdz.2	As Rdz.1		
Rdz.3	Diode, Zener, type ZF.5,6	INTERMETAL	9005352
RV1	Resistor, variable 200 ohm ±10% type 3067-P-201 (ø 9,1x27 mm.)	BOURNS	9005351
V.1	Transistor NPN, type 2N708	SGS	9082773
V.2	As V1 (CV8844)		
V.3	As V1		
V.4	As V1		
V.5	Transistor NPN type 2N1613	SGS	9085936

Diagr. Ref.	Denomination	Supplier	FACE Code
V.6	Transistor PNP type 2N1131	SGS	9005379
V.7	" NPN type 2N1893 CV 7404	TEXAS	9005377
V.8	" NPN type BDY10	PHILIPS	9005378

PART 4

ILLUSTRATIONS

NOTE : Fig.3 is in the text at page 7

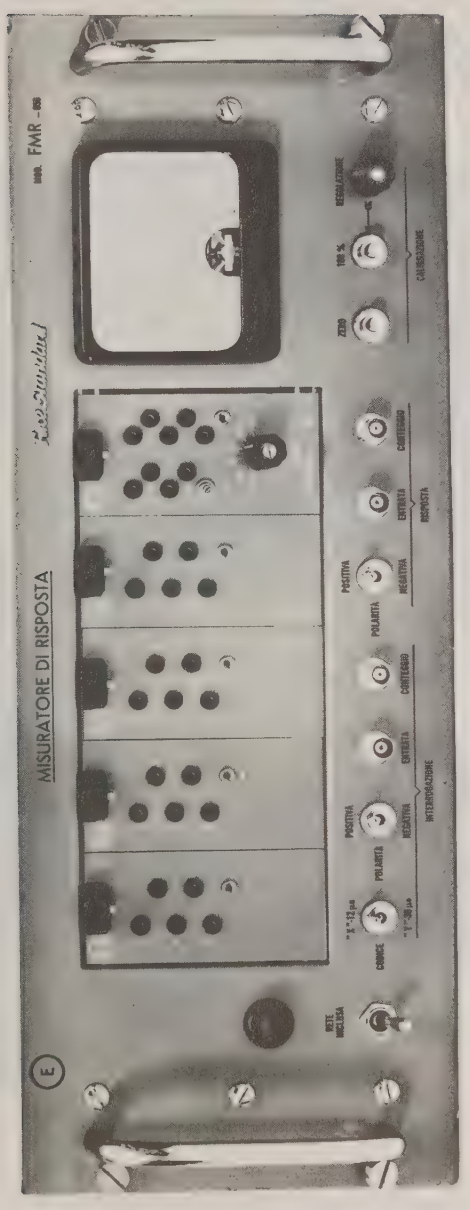


FIG. 1

REPLY METER - FRONT VIEW

MISURATORE RISPOSTA - VISTA FRONTALE

.639/A

.639

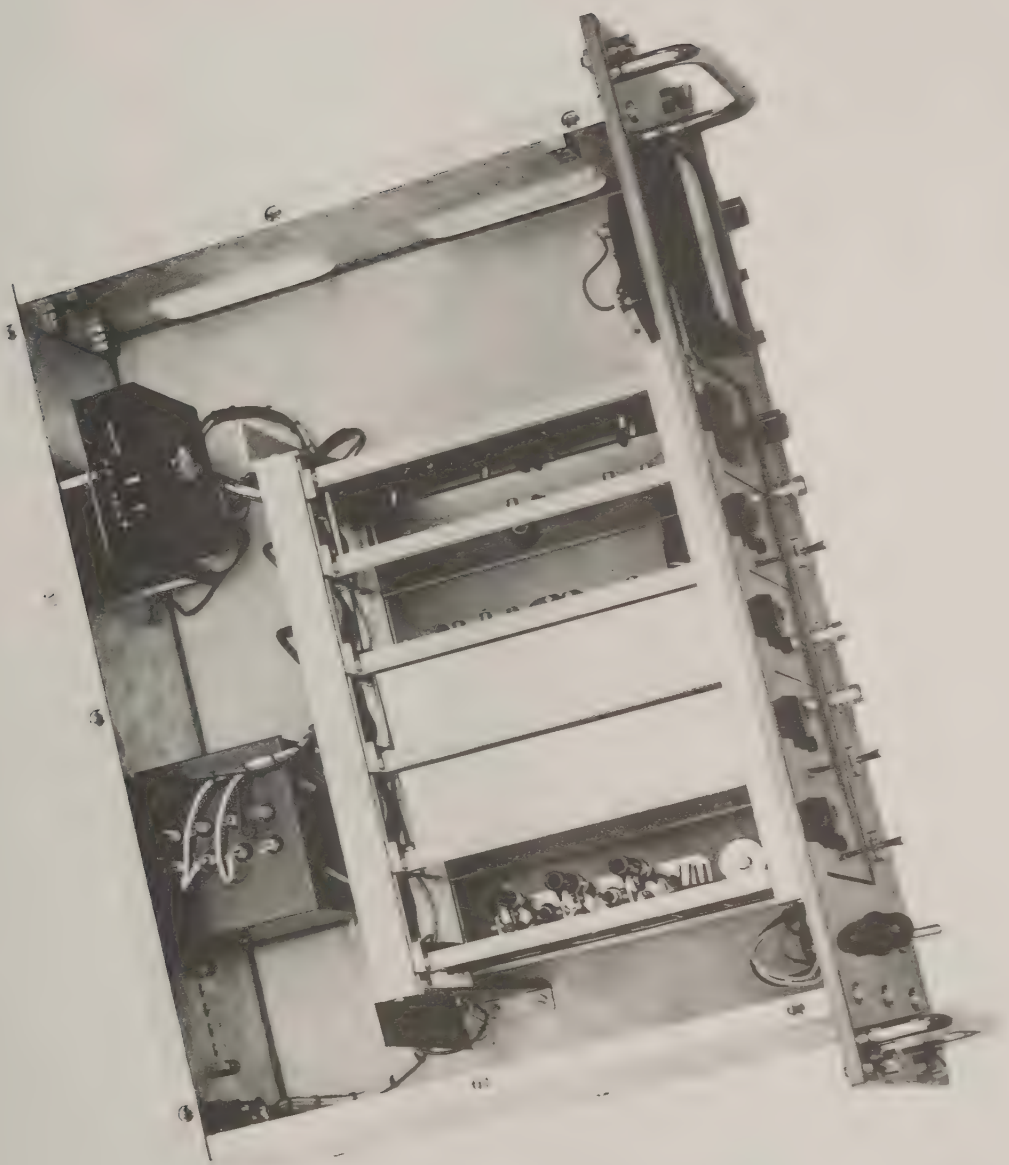
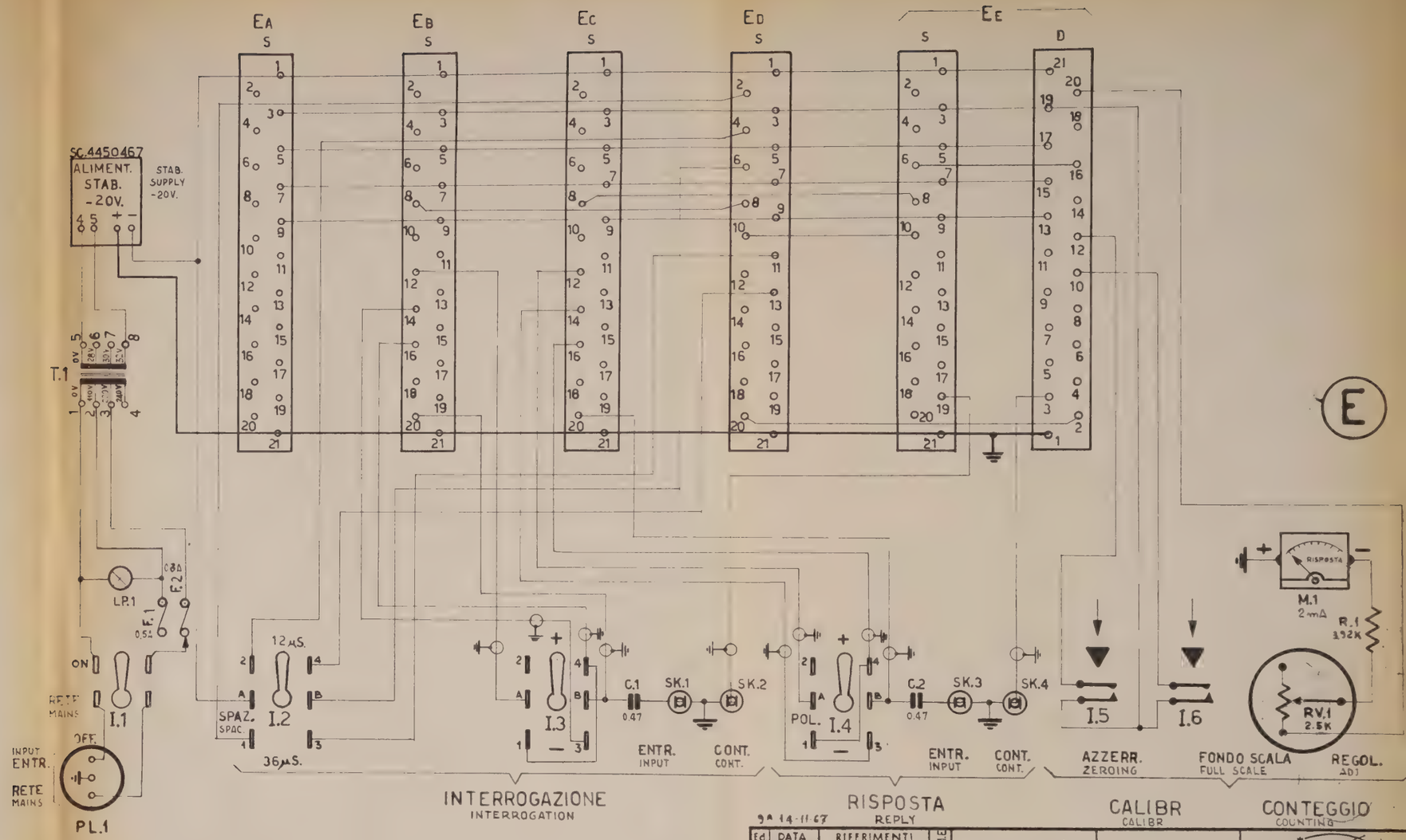


FIG. 2

REPLY METER - UPPER VIEW

MISURATORE RISPOSTA - VISTA SUPERIORE



9A 14-11-67

Ed.	DATA	RIFERIMENTI
1A	18-5-66	
2A	12-7-66	
3A	13-6-67	
4A	4-7-67	
5A	26-7-67	
6A	28-8-67	
7A	20-9-67	

STRUM. D.M.E.

TM. 639/A

FIG. 4

Face Standard

REPLY METER

MISURATORE DI RISPOSTA

SCALA

LUC. | DIS.

CONT. | APP.

SC.1450056 TAV. 1-4

STC
ARCONI

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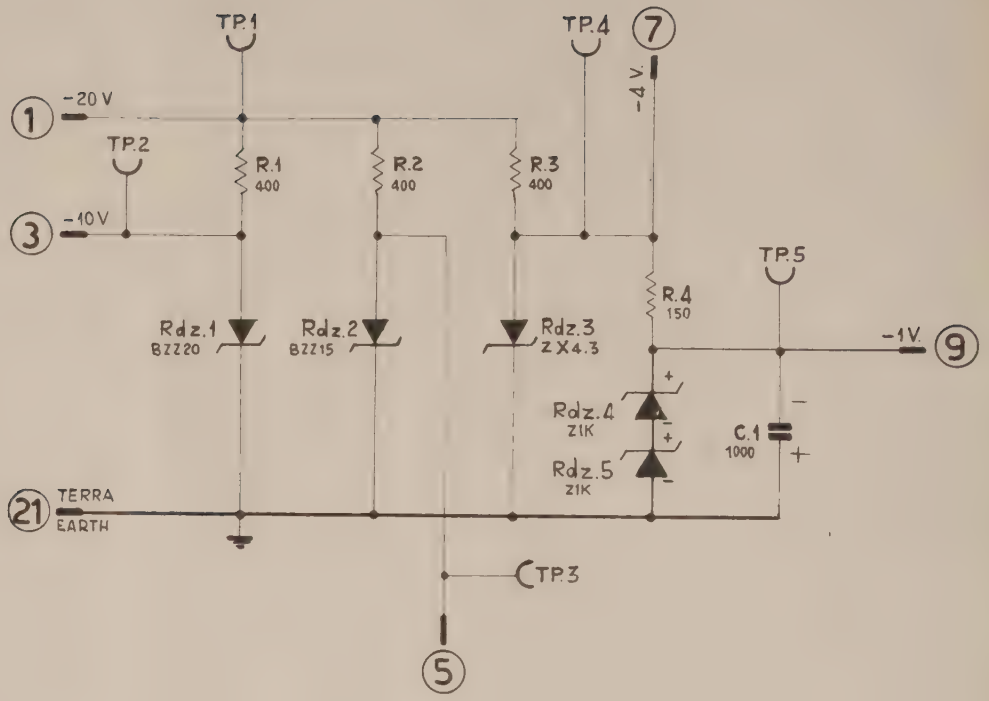
SC.4450535 TAV. 1-2



E.A.S

Ed.	DATA	RIFERIMENTI
1A	13-4-66	
2A	13-6-67	
3A	4-7-67	
4A	27-10-67	

STRUM. D.M.E.

IMP.

TM. 639/A | FIG. 5

Fuce Standard

REPLY METER STAB. P.S.

MISURATORE DI RISPOSTA
STABILIZZATORE
-10; -6; -4; -1 V.

SCALA

LUC. | DIS. Castelli

CONT. | APP.

SC.4450535 TAV. 1-2

Mod. IC C. T. 751 - 9874010

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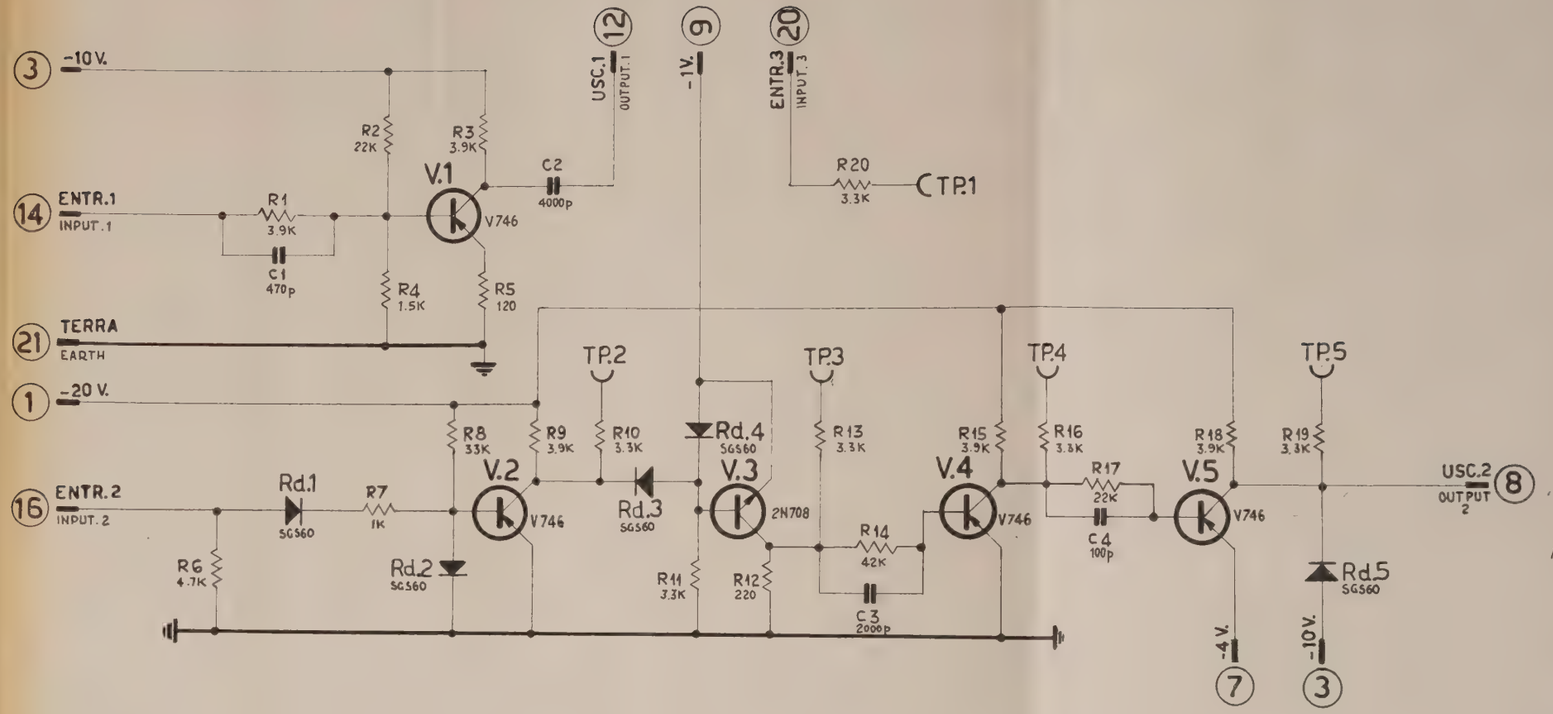

EBs

Ed.	DATA	RIFERIMENTI
1A	18-4-66	
2A	4-7-67	

STRUM. D.M.E.

TM. 639/A

FIG. 6

Face Standard

REPLY METER
INV. AMPL. INTERROG. SIDE

MISURATORE DI RISPOSTA

SCALA

LUC. | DIS. Cartesio

CONT. | APP.

SC.4450530 TAV 1-4

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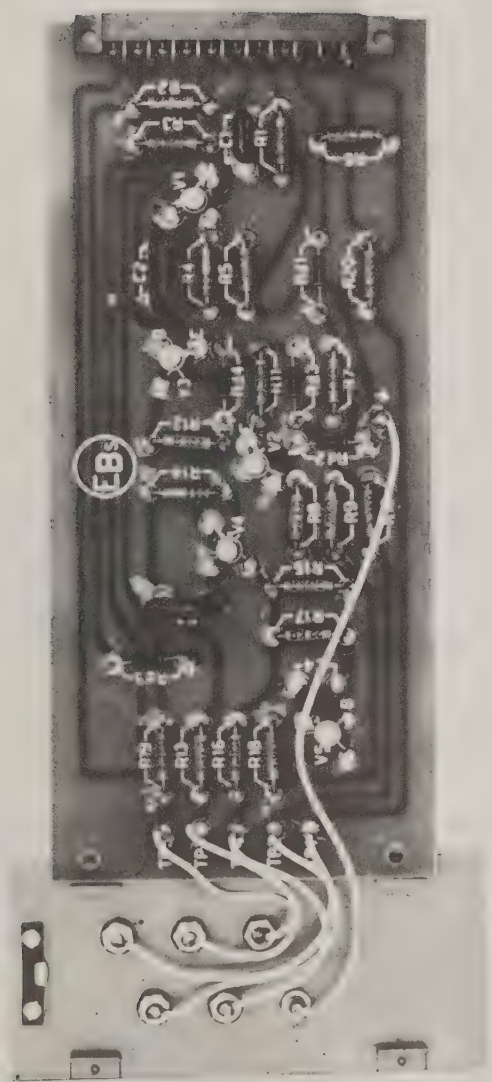


FIG. 6a

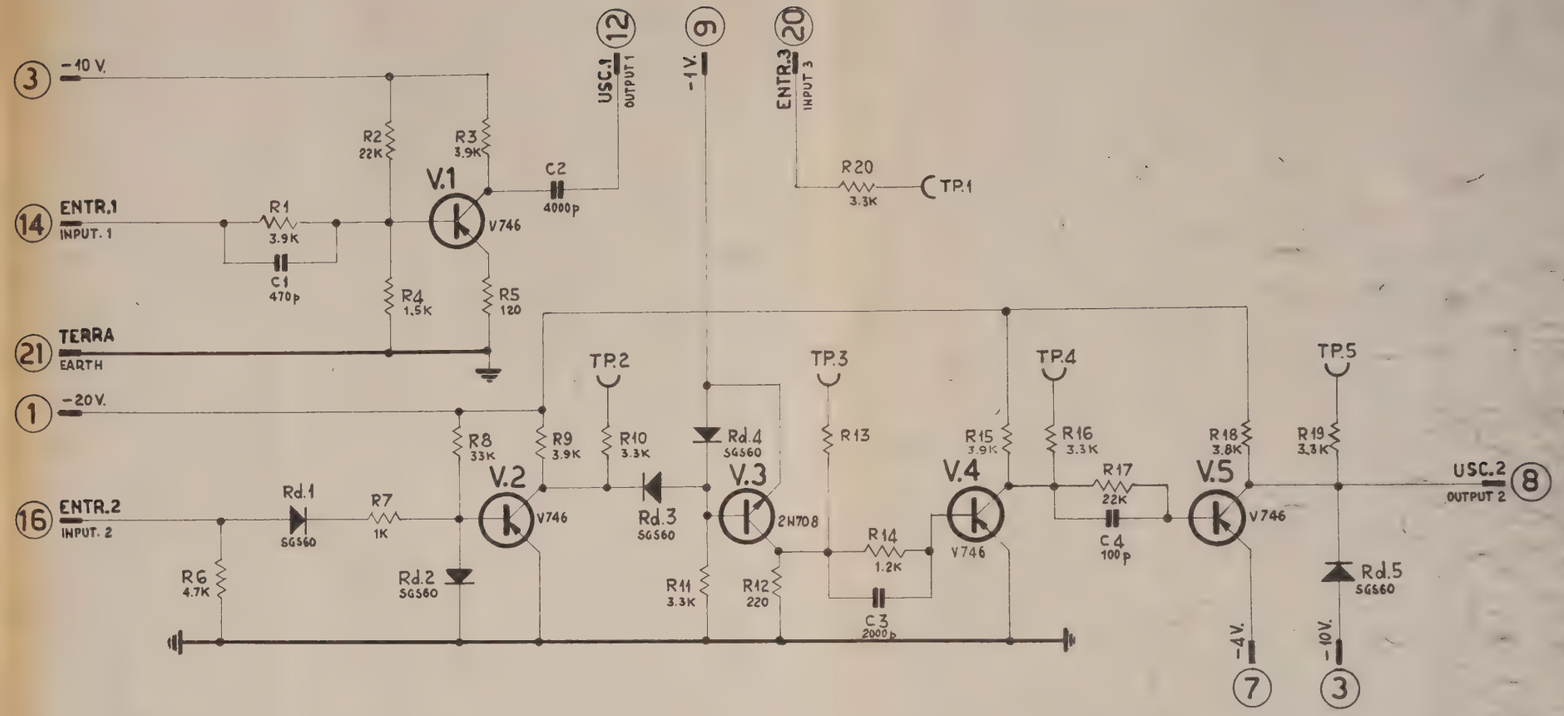
INVERTED AMPLIFIER -INTERROG. SIDE (EB) -INTERNAL VIEW

AMPLIFICATORE INVERTITORE -LATO INTERROG. (EB) -VISTA INTERNA

M.639/A

M.639

SC.4450531 TAV. 1/a



EC.s

Ed.	DATA	RIFERIMENTI
1A	18-4-66	
2A	4-7-67	

STRUM. D.M.E

TM. 639/A | FIG. 7

Face Standard

REPLY METER
INV. AMPLIFIER REPLY SIDE
MISURATORE DI RISPOSTA
AMPLIFICATORE INVERTITORE RISPOSTA

SCALA
LUC. | DIS.
CONT. | APP.

SC.4450531

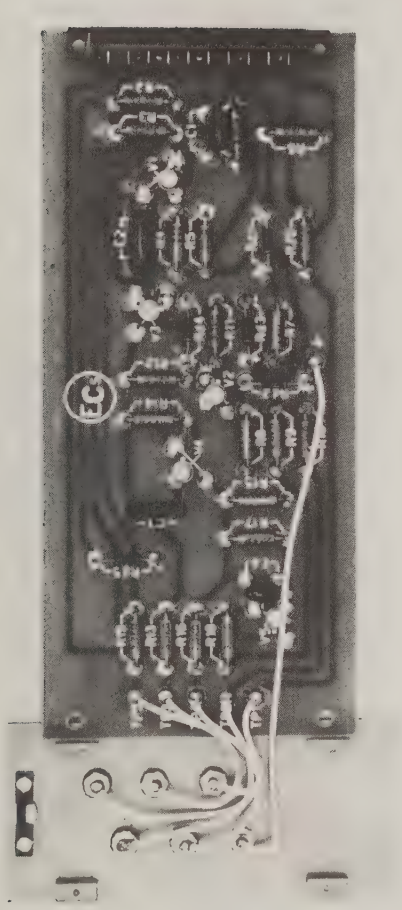
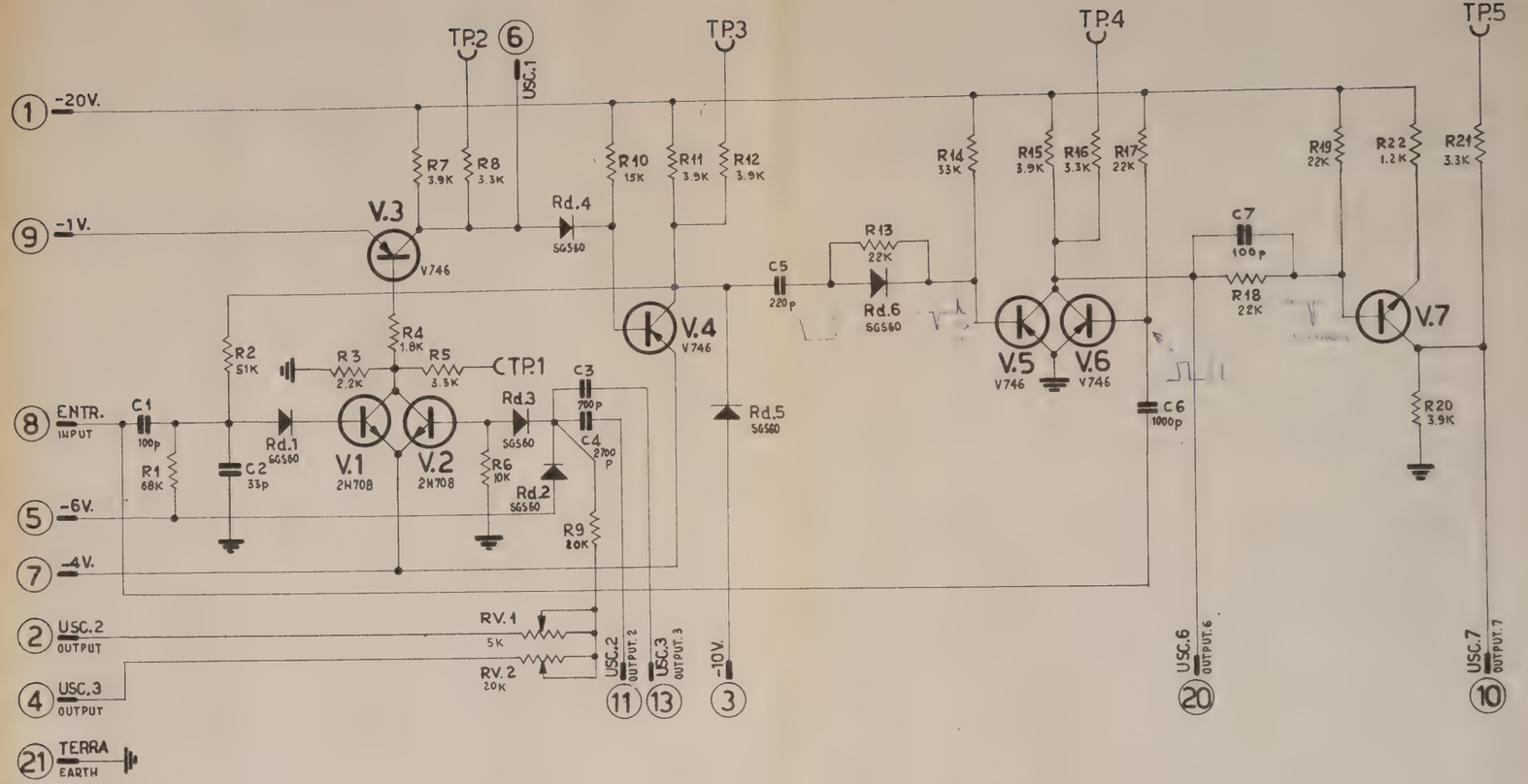


FIG. 7a

INVERTED AMPLIFIER - REPLY SIDE (FC) - INTERNAL VIEW

AMPLIFICATORE INVERTITORE - LATO RISPOSTA (FC) - VISTA INTERNA

A



ED.s

Ed.	DATA	RIFERIMENTI
1A	19-4-66	
2A	13-6-67	
3A	4-7-67	
4A	14-11-67	

STRUM. D.M.E.

TM. 639/A

FIG. 8

Face Standard

REPLY METER
INTERROGATION DECODER

MISURATORE DI RISPOSTA
DECODIFICATORE INTERROGAZ

SCALA

LUC. | DIS. Castel

CONT. | APP.

SC.4450532

SC.4450532 TAV 1-4

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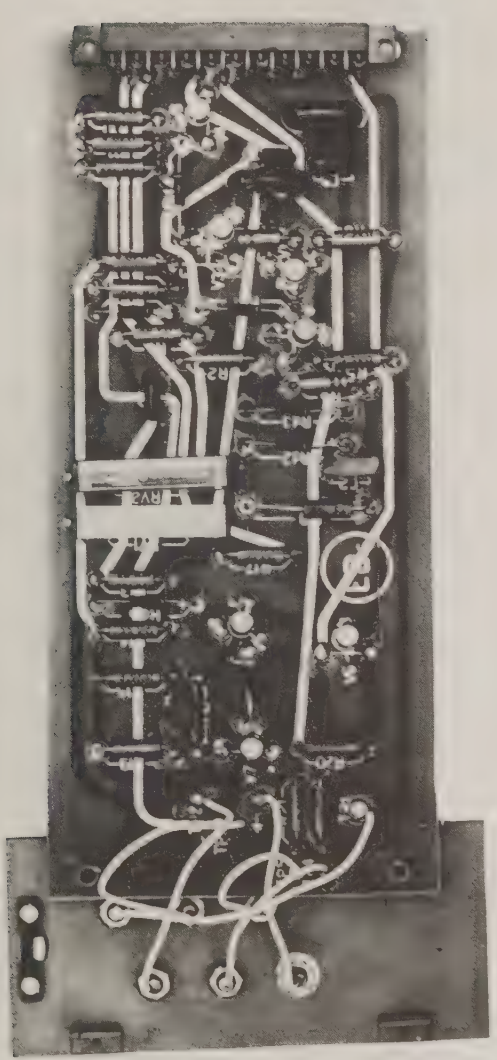
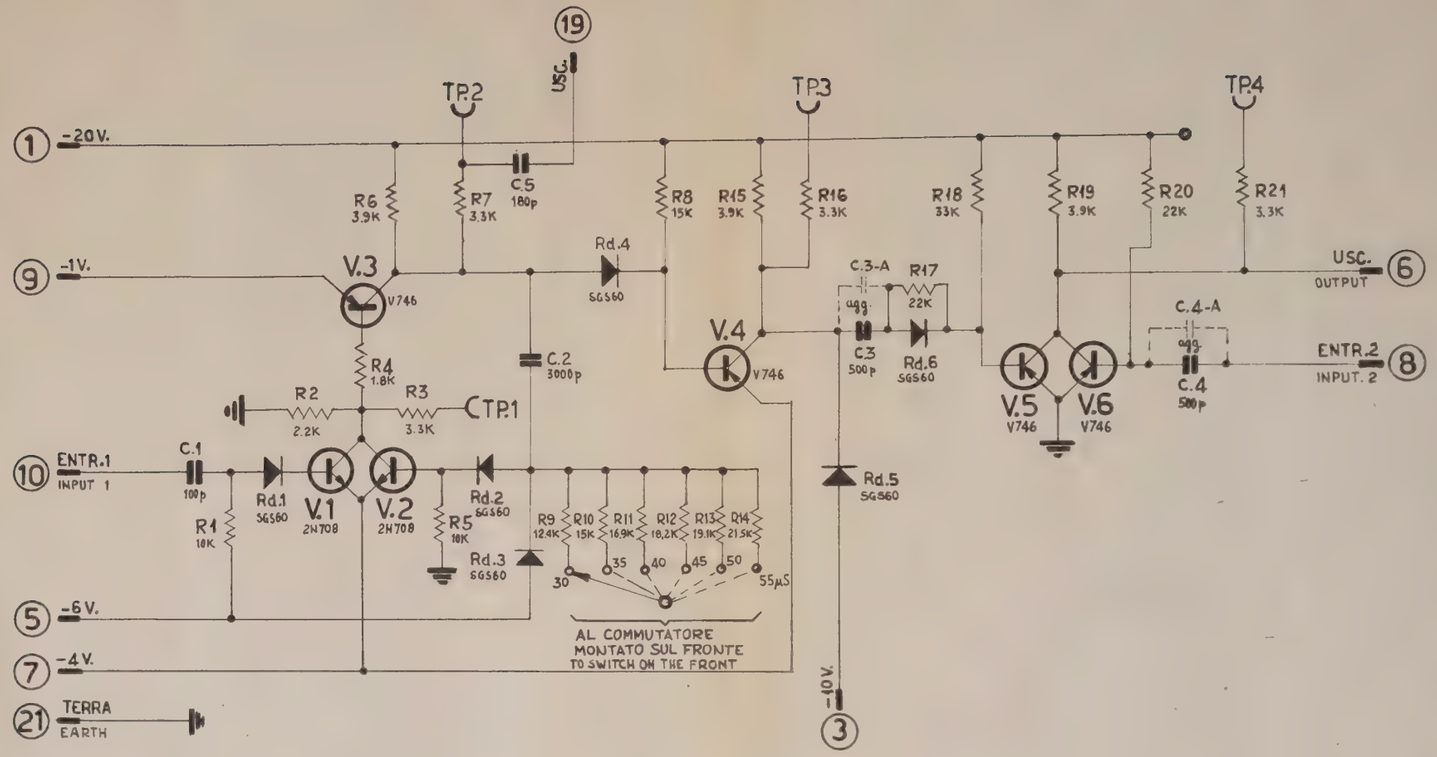


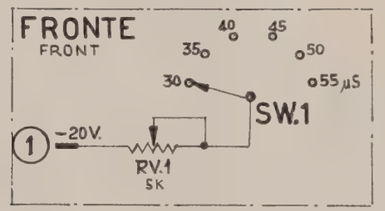
FIG. 8a

INTERROGATING DECODER (ED) - INTERNAL VIEW

DECODIFICATORE INTERROGAZ. (ED) - VISTA INTERNA

SC. 4450533





EE.s

Ed.	DATA	RIFERIMENTI
1A	26-4-66	
2A	3-10-66	
3A	9-5-67	
4A	4-7-67	
5A	14-11-67	

STRUM. D.M.E

TM. 639/A | FIG. 9

Face Standard

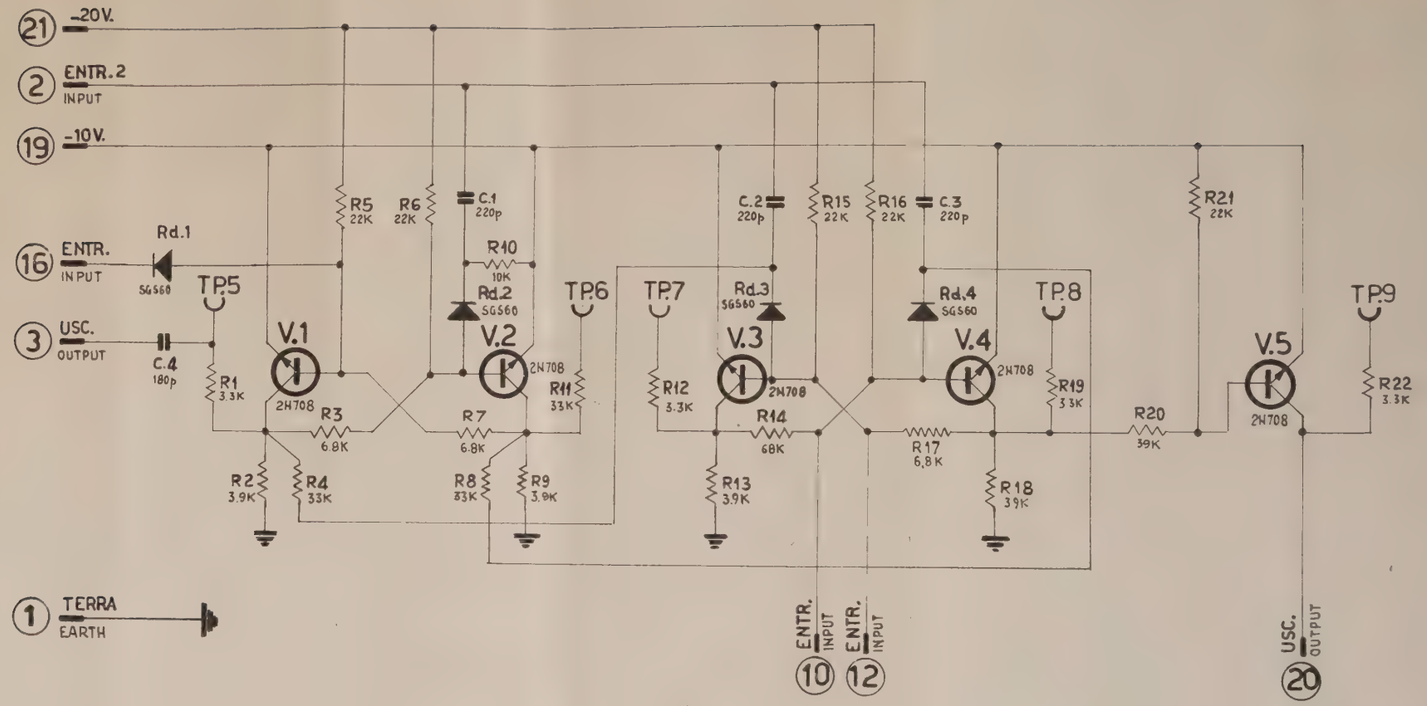
REPLY METER
INTERROG. DELAY AND COINCIDENCE

MISURATORE DI RISPOSTA
RITARDO INTERROG. E COINCIDEN

SCALA
LUC. DIS
CO APP.

SC. 4450533

SC.4450534 TAV. 1-4



EE.d

Ed.	DATA	RIFERIMENTI
1A	22-4-66	
2A	9-5-67	
3A	4-7-67	

STRUM. DME

TM. 639/A | FIG. 10

Face Standard

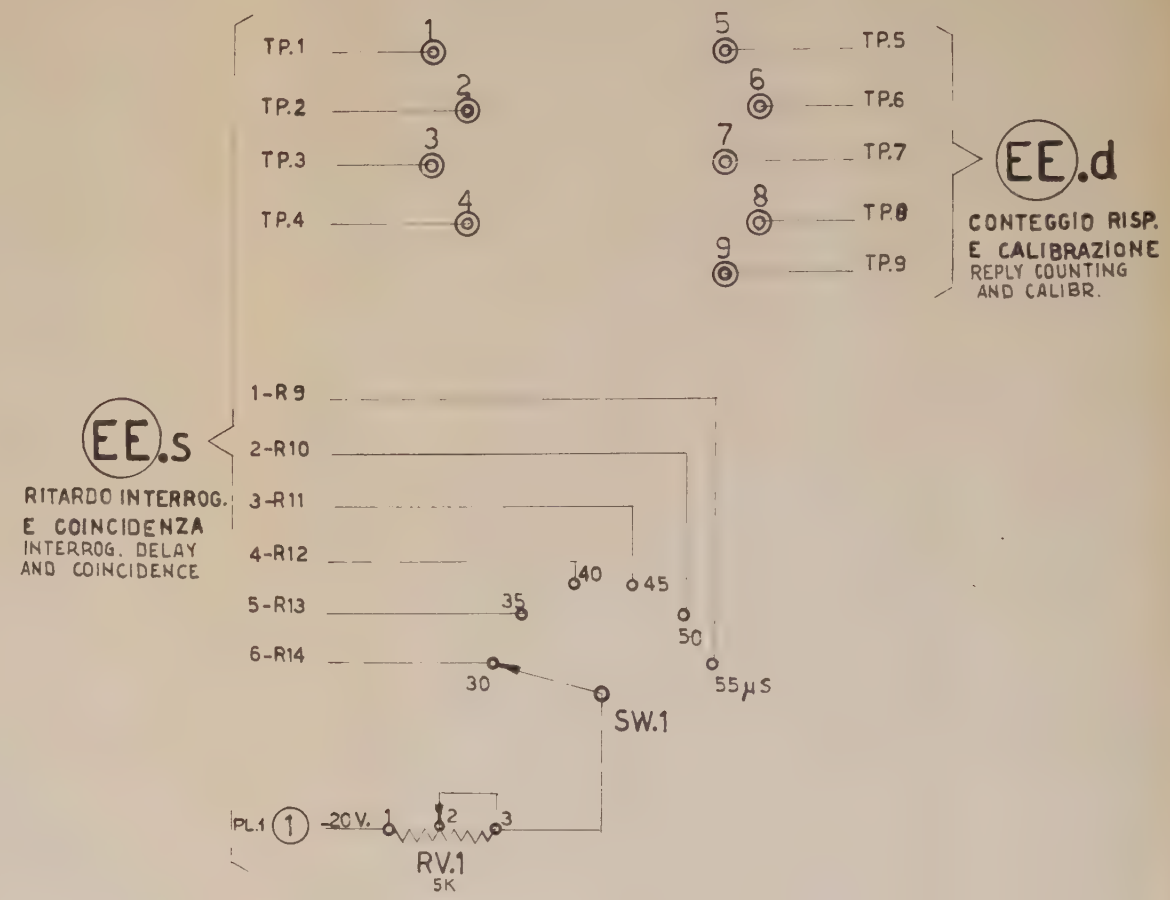
REPLY METER
REPLY COUNTING AND CALIB.
MISURATORE DI RISPOSTA
CONTEGGIO RISPOSTA E CALIBR.

SCALA

LUC. | DIS. | CON. | APP.

SC.4450534

SC.2450185 TAV. 1-2



EE

Ed.	DATA	RIFERIMENTI
1A	27-5-66	
2A	4-7-67	

IMP. STRUM. D.M.E.

TM. 639/A | FIG. 11

Face Standard

REPLY METER
INTERROG. DELAY AND COINCIDENCE
REPLY COUNTING AND CALIB.
MISURATORE DI RISPOSTA
RITARDO INTERROG. E COINCIDENZA
CONTEGGIO RISPOSTA E CALIBRAZ.

SCALA
LUC. | DIS. Cavatura
CONT. | APP.

SC.2450185 | TAV. 1-2

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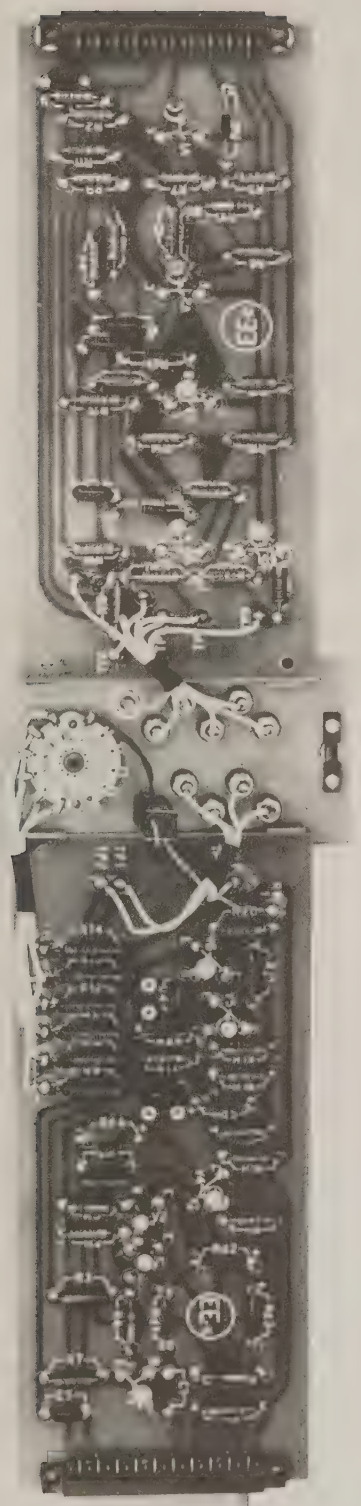

FIG. 11a

INTERROGATING DECODER AND REPLY COUNTING (EE) - INTERNAL VIEW

DECODIFICATORE INTERROGAZ. E CONTEGGIO RISPOSTA (EE) - VISTA INTERNA

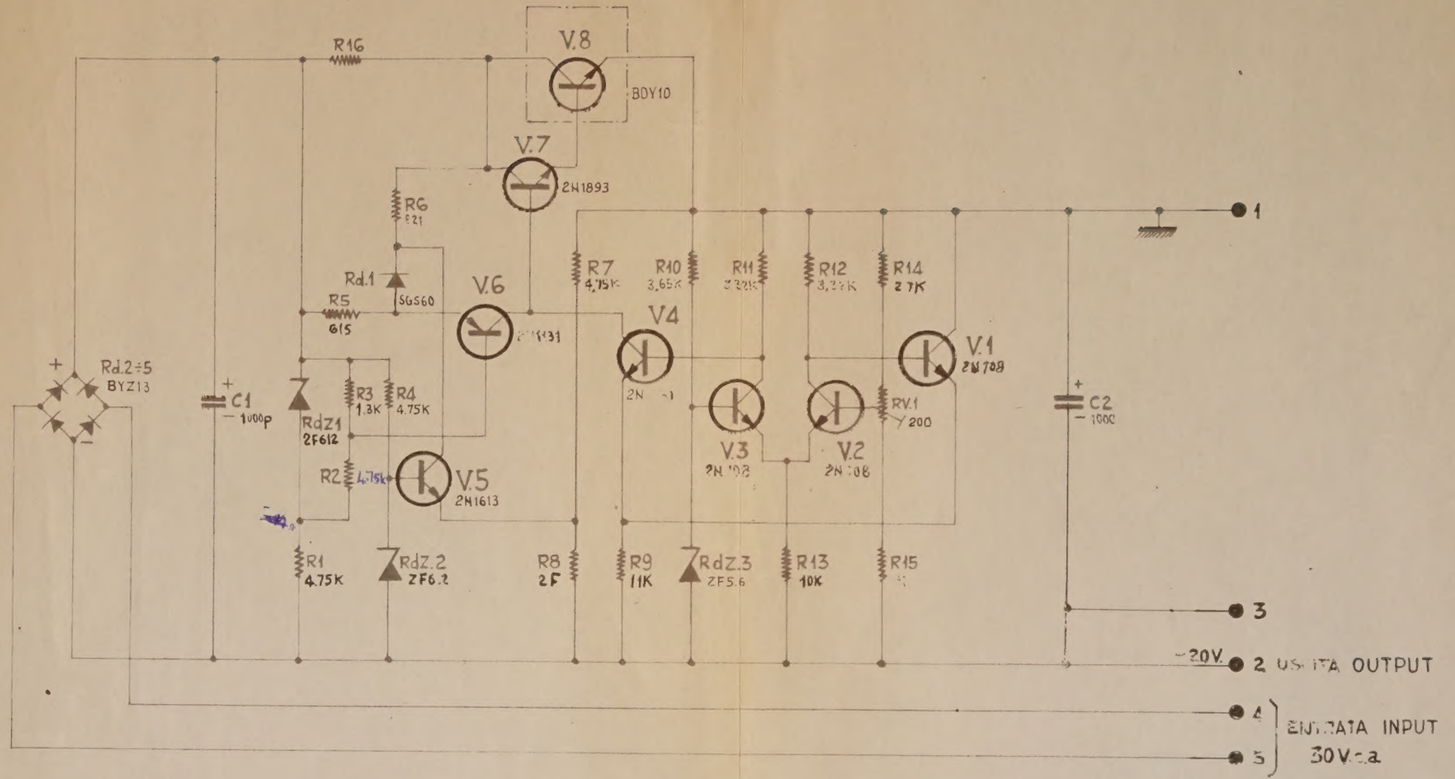

FIG. 3.17

TM 567

Ed.	DATA	RIFERIMENTI
1A	3-9-65	
2A	10 2 66	
3A	6-6-67	

DME

TM 639/A

FIG. 12

Face Standard

ALIMENTAT-20V STABILIZZ.

-20V STABILIZED SUPPLY

SCALA

LUC.

DIS.

CONT.

APP.

SC 4450467

SC 4450467 TAV 1-4

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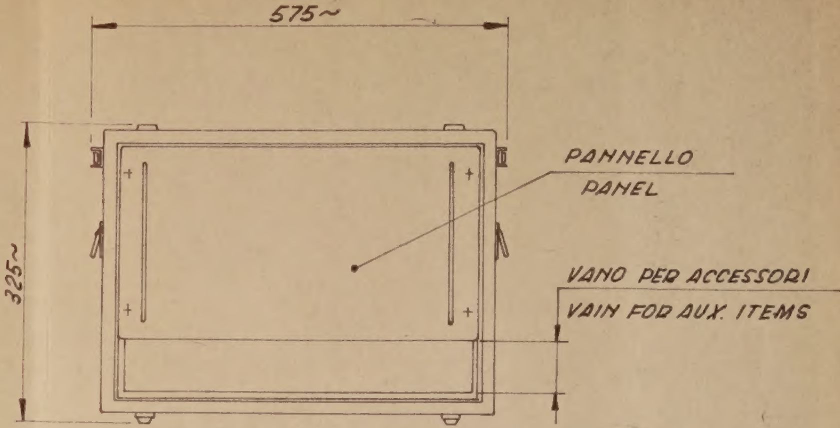

FRONTE
FRONT

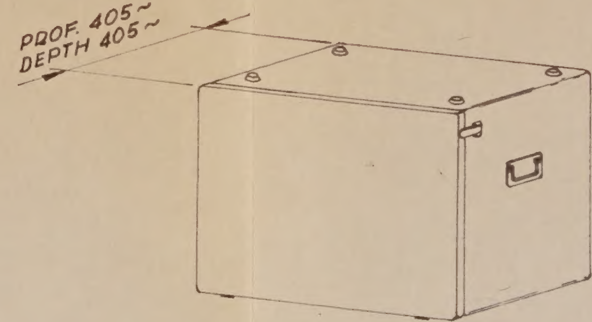

FIG. 13

Ed.	DATA	RIFERIMENTI	
1ª	11-5-67		

MISURAT. DI RISP. MOD. FMR-056
IN COFANO METALL. TRASPORT.
—O—
RESPONSE METER MOD. FMR-056
IN TRANSPORT. METAL CABINET

Face Standard	
SCALA	
LUC.	DIS.
CONT.	APP.
TM 639	

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